JULY 1996

Everything you need under one cover

ALL ABOUT MEMORY P172

Personal Computer World

Personal Computer World

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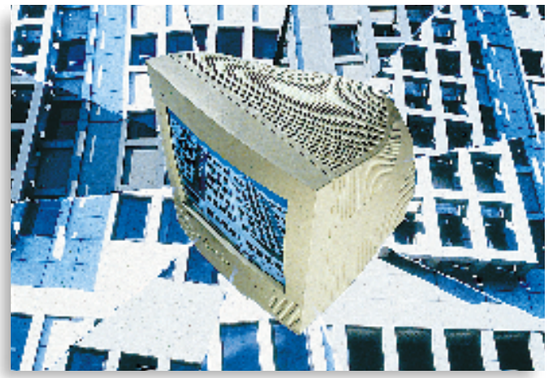

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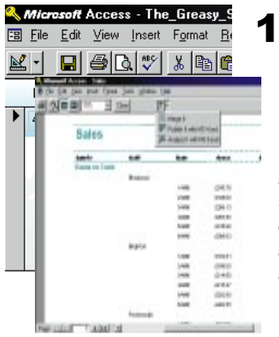

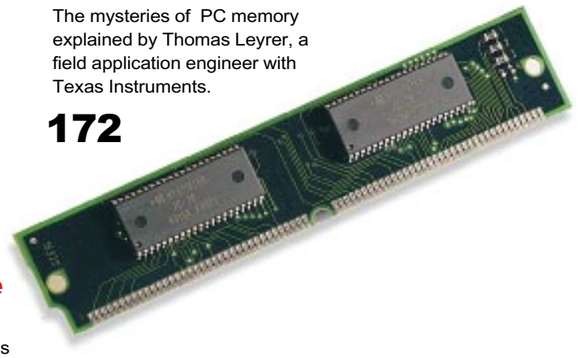

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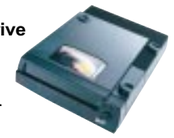


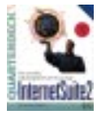

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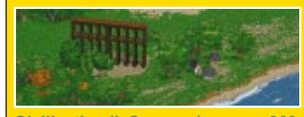

Civilisation II: Screenplay page 263

Hands On

PCW Cover Disk

A cracking cricket simulation, music while you work and the virtual cat.

International Test Cricket is an accurate, statistic-based cricket Test Match simulation.

Select your teams from a squad of 20 players and play up to six Tests in a series. You can play against an intelligent CPU opponent or a human one and complete player averages and records are calculated. Your team, its batting and bowling order and level of aggression can be set, as can the pitch, ball, bounce, weather and outfield conditions.

● **Playing a League:** The ability to play in a league allows you to play home and away series of however many tests you choose, with several squads playing. Each squad can be controlled either by a player or by the computer, and points are awarded for wins, ties, or draws.

● **Playing a Series:** A series can be played as a one-off between two teams or as part of a league. At the end of each series, all the records are compared and updated. A series summary will be displayed unless it is a league match, in which case it will continue onto the next series.

For full details on how to use the program, please refer to the CRICKET.WRI document in the CRICKET directory which is created by the cover disk installer.

● *Minimum Requirements: 386SX processor, Windows 3.x/Windows 95, 4Mb RAM, VGA display.*

Sonic Jukebox

Sonic JukeBox (SJB) is a fun way to play a whole batch of sound files on a suitably equipped PC or compatible. Unlike Sound Recorder and Media Player it allows you to select a number of music files and play them, either one by one, or randomly using a special Shuffle mode. It can work in the background so you can listen to the music while you carry on with computing tasks, or while the program is minimised. If you want some entertainment while the computer is busy doing something, or while you wait for a document to print, watching out for the program's random animations is more than a match for twiddling your thumbs. Some of the animations appear very rarely, so SJB will hold a surprise or two for you for quite some time.

Note that this demo version of the program does not allow you to add your own tunes to the play list.

● *Minimum Requirements: 386SX processor, Windows 3.x/Windows 95, 4Mb RAM, VGA display.*

Evolution Audio demo

Evolution Audio is a MIDI sequencing package that allows you to integrate 8-bit or 16-bit CD-quality audio with MIDI. The result is a low-budget home recording studio on your PC. You can record on up to 256 tracks, include audio patterns (.WAV files) and even a chord track with 16 preset styles.

Produced by UK musical software developer, Evolution Electronics, the software provides a unique combination of Digital Audio, Easy Play features and MIDI recording. Its user-friendly graphical interface leaves you free to concentrate on the most important thing: making great music. Please refer to README.WRI in the EVADEMO (it is created when you install the cover disk software), for full details on using this demo.

Topcat

Now you can have your very own virtual cat on your desktop. Watch it play and follow your mouse around!

● *Minimum Requirements: 386SX processor, Windows 3.x/Windows 95, 4Mb RAM, VGA display.*

Robin Nixon

To install the Cover Disk programs, from File Manager or Windows 95 Explorer, double click on the program displayed in your floppy disk root director and follow the instructions.

PLEASE READ THIS

If you have problems with the Cover Disk such as receiving a "Cannot read from drive A" error, please return the disk to the duplicator: TIB PLC (PCW), TIB House, 11 Edward Street, Bradford BD4 7BH (who may be contacted on 01274 736990) together with a stamped addressed envelope and two 25p stamps. Where it is a duplication fault, the postage will be returned along with a replacement disk.

If your problem is not due to a faulty disk, and a phone number is shown for the publisher of the program in question, then it will probably be quicker for you to call them first as they will be able to provide direct assistance on their own programs faster than might otherwise be possible.

Alternatively, ring our floppy cover disk hotline on weekdays between 10.30am and 4.30pm on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.

The *PCW* cover disk is virus checked at every stage of production. However, *PCW* will not accept liability for any problems arising from the use of the disk. Installing or running any of the programs on the disk indicates your agreement to this condition.

You are advised not to install any software on a networked PC before checking the disk. While *PCW* maintains a high standard of quality control, disks may be damaged in transportation. Check the disk's shutter before inserting it in the drive by sliding it to the left and allowing it to spring back.

PCW Interactive CD-ROM

The very best in PC and Mac entertainment, information, applications, utilities, movies and more.

J U L Y 1 9 9 6

PCW INTERACTIVE: Entire Contents List

DEMOS

Allied General — World War II strategy game
Avenger — Defender-style shoot-em-up
Bluebook — Fast and versatile personal database
EasyCAD — Wicked design program
Cinemania 96 — Rolling demo
Scrutiny Beyond The Great Realms — New Age experience
Sonic Jukebox — Powerful music player
Virtual Karts — Racing mayhem
Virtual Snooker — Snooker at it's best
Wings, Korea to Vietnam — Interactive edutainment aircraft demo
Wings, Midway to Hiroshima — Superb interactive multimedia demo

SHAREWARE FOR DOS

Enigma — Bat and ball game

SHAREWARE FOR WINDOWS 3.1

Cricket — Cricket simulator
Family — Family organiser
HTML assistant — Powerful, web page creator
Multiwave — WAV player
Ncrypt — Encryption program
Power Planner — Project planning system
Topcat — Feline desktop fun

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SHAREWARE FOR WINDOWS 95

Inkutils — Collection of 11 excellent utilities

MAGAZINE

All the files from articles in this issue

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The contents of the cover floppy disk

CLIPART

1,000 clipart images from Crown Computers

BEST OF BRITISH

Vast collection of the very best Shareware from UK publishers

REGULARS

Video for Windows — Version 1.1e (Win 3.x only)
CD Test — CD-ROM integrity checker

MACINTOSH

25Mb collection of the latest shareware and demos

● **Minimum requirements:** 4Mb free RAM (some can be in a permanent swapfile), 386SX/33 processor, Windows 3.1. Users with less than this should be able to run all the DOS programs on the CD-ROM directly from DOS or Windows (rather than using the front-end). For best performance we recommend: 8Mb installed RAM, 486 DX/50 processor, Windows 3.11 or Windows 95.

MAIN FEATURES

Demos

● **Allied General:** If you like games such as Fantasy General then you'll love this strategy game based on World War II. The aim is to work your way to becoming the ultimate power.

● **Avenger:** The good old days are back again with this superb clone of Defender. It was one of the first space shoot-em-ups to venture into the arcade and has now been revamped into an impressive up-to-date version.

● **Bluebook:** A fast and versatile personal database.

● **EasyCAD:** Easy CAD gives you the power to create any sort of building or mechanical design you want.

● **Cinemania 96:** A huge database of information on movies and films. It includes hours of footage and stacks of film reviews.

● **Scrutiny Beyond The Great Round:** Weird to say the least, this was the winner of the Milia D'Or Grand Prix. Just sit back and enjoy this New Age delight.

● **Sonic Jukebox:** You can now have your very own jukebox on your desktop: insert your virtual cash and select your desired track.

● **Virtual Karts:** Step hard on the throttle in this mad mayhem driving demo. All the thrills and spills of kart racing are here.

● **Virtual Snooker:** Interplay first released Virtual Pool about a year ago

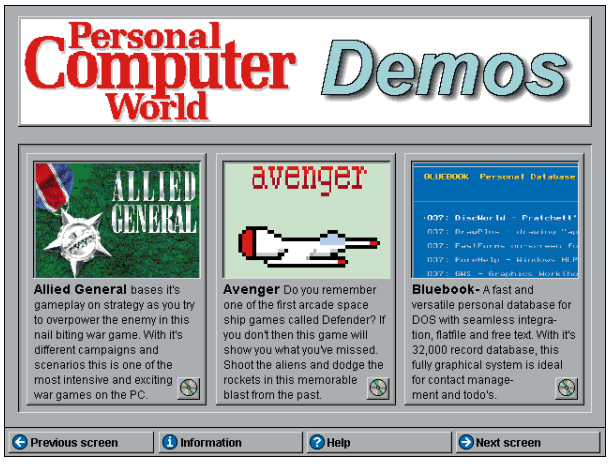
CONTINUES ON PAGE 131

CONTINUED FROM PAGE 9

All the files from articles in this issue, and you can take pot luck with virtual snooker as well as other entertaining features. If you like playing war games, you can play the Allied General or enter space and shoot up aliens

and it was a superb game. Now the company has taken a step into snooker. Designed with the aid of the six-times world champion, Steve Davis, this is an exceptional game which feels as if you were playing the game for real. If you have two PCs, you can link them together and play head-to-head.

● **Wings, Korea to Vietnam:** Interactive demo based on the aircraft, the missions and the strategy of the warplanes in the Korean and Vietnam wars.



Macintosh

For Mac users, there's 25Mb of the very best new games and utilities.

Configuring Video for Windows

If you select the "New users start here" button on the first page of *PCW* Interactive, you'll have the opportunity to install the latest version of the Video for Windows runtime, so that you can view the digital movies on the CD. If you haven't installed Video for Windows from a *PCW* Interactive CD before, then you should install this new version, as it contains the latest drivers which deliver higher quality, a larger size and a faster playback rate. If you don't install the new version, some videos will display the message "Cannot display this video", or similar warnings.

There are also some extra buttons on the Video for Windows page which allow you to fine-tune your PC's performance without having to leave *PCW* Interactive or restart Windows. In particular, you can choose to have digital movies played back on your PC at full-screen resolution,: without having to resort to hardware add-ons such as MPEG cards.

But remember: when you exit from *PCW* Interactive, if you leave the option for full-screen video selected, then all video in other applications will also be full screen. If you don't want this, re-run *PCW* interactive, select the "Windowed" option and quit again.

Testing your CD-ROM

If you suspect that your CD-ROM may be faulty or damaged you can run the file CDTEST.EXE in the SYSTEM directory of the CD-ROM. The program will then examine every byte of data in the PC partition of the disc to see if it can be correctly read. The process takes up to 35 minutes and generates a verification code if the disc passes the test. If the CD-ROM fails this test, try cleaning it with a light solution of washing-up liquid and dry it with a lint free cloth and run the test again. If it still fails, return your CD-ROM to the magazine for a free replacement.

You are free to copy the CDTEST.EXE program to your hard disk in order to test other CD-ROMs, as long as it is not distributed in any way. If you are running CDTEST from your hard drive you need to specify the CD-ROM drive to test, as follows:

```
CDTEST D:
```

Note: We offer this tool purely as an aid to diagnosing possible faults, some of which may occur because an older version of MSCDEX.EXE is in use and not because of a faulty CD-ROM and disclaim any responsibility for any erroneous error reports that it may generate.

IMPORTANT — READ THIS!

● **General Protection Faults**

If you receive General Protection Faults when running PCWI, or playing any digital videos it is probably because your graphic display driver may not be 100 percent Microsoft compatible. The answer, therefore, is to install one of Microsoft's own drivers, as follows (but NOT if you are using Windows 95, as the drivers supplied with it are even newer than the ones on this disc):

1. Run "Windows Setup" from File Manager, then select, "Options" followed by "Change System Settings".
2. Scroll through the list of displayed graphic drivers until you get to the final entry "Other Display (Requires Disk from OEM)", and select it.
3. Insert this month's CD-ROM into the drive and replace the "A:\" prompt with "D:\SYSTEM\SVGA256" (changing the D: to the correct letter if your CD-ROM is not in drive D:), then press Return.
4. Scroll through the new drivers until you find the ones beginning "Super VGA…" and select the one for the resolution you prefer to use. The driver will then be installed and Windows

There's range of top British shareware for you to enjoy, as well as something for inky thinkers. Plus, go arty crafty with our 1,000 free clipart illustrations

restarted. PCWI and Video for Windows should then have no further problems.

If this works (which it should in 95 percent of cases), you may wish to contact the supplier of your graphic card to see if they have an updated graphic driver. If Microsoft's drivers don't work you will need to contact your graphic card supplier anyway.

● If Video for Windows install fails

If the Video for Windows installation fails and you receive an error such as "XXXXXXXX.YYY cannot be updated as it is a shared file". The answer is to delete the file "XXXXXXXX.YYY" (or whatever it is called) and reinstall Video for Windows.

● PCWI is slow to load, or runs slowly

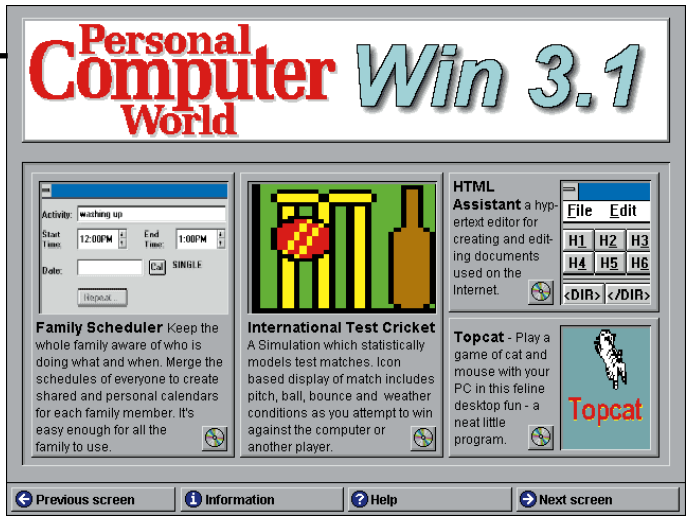
You need at least 4Mb of RAM free to use PCWI. If necessary, you can obtain this by creating a permanent swap file of up to 4Mb. You are also advised to enable read cacheing of your CD-ROM by adding its name to the SMARTDRV line in your AUTOEXEC.BAT file. You should also allow MSCDEX to set up its own buffers by adding a line such as /M:10 to the MSCDEX line, also in your AUTOEXEC.BAT file. Please refer to your manuals for full details.

● Windows NT and OS/2

Unfortunately Macromedia Director, the program used to create PCWI, is incompatible with earlier versions of Windows NT, but works just fine with the latest release. You should be able to run PCWI from OS/2 by simply calling up PCWI.EXE from the command line.

Robin Nixon

Go bats with your own virtual Test Match. Or go cats and let your feline friend keep you company on your desktop. And with the Family Scheduler, you can keep that family in line!



PCW Advice & Contacts

The PCW CD-ROM is virus checked at every stage of production. However, *PCW* will not accept liability for any problems arising from its use. You are advised not to install software on a networked PC before checking the disc.

For technical support on the CD-ROM and the programs on it call the VNU 24-hour Hotline on 0891 616 444. This is a computerised touch-tone advice system, providing hints and tips on a wide range of topics. It also offers you the opportunity to speak to a member of our technical support staff during office hours by pressing the 0 key on your keypad. Calls cost 39p min off-peak and 49p at all other times (tone phones only).

Using the computerised system you can access the information you need very quickly. If you request to speak to a member of our technical support staff and we cannot answer your question immediately, we will offer to call you back at our expense. Outside office hours you can leave us a message by pressing the 9 key. If you leave your phone number we'll call you back at the earliest opportunity during office hours.

If you prefer, you can email rnixon@cix.compulink.co.uk, or on CompuServe 70007,5547.

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Editorial

WEB APPLIANCES AND CUT-down network computers are variations on a theme. Both are based on the idea of taking intelligence out of the terminal/client end of things and putting it on the server. Web appliances are targeted at consumers, while cut-down clients fulfil a similar role for companies.

There's nothing new about the idea. Dumb terminals have been around for ages. However, since PCs arrived on the scene, dumb terminals have been on the back foot. The general trend has been towards putting *more* power and intelligence on the desktop, not less. Diskless PC workstations never really caught on because of their impact on network performance and because users wanted local hard disks on which to keep their stuff.

The difference, this time around, is the Internet factor. Or so chief appliance proponent, Oracle, would argue. Yet network appliances face some problems. Hot consumer products need to be cheap, but cheap appliances may not include the 3D graphics, full multimedia and virtual reality that will make them compelling.

Although there is potential for building Internet capability into products like televisions, cut-down network computers make more sense for businesses. They keep costs down because, instead of upgrading machines on every desktop, you only need to upgrade the server and they improve security and manageability.

IBM, Sun and Oracle are all putting efforts into cut-down network computers. Not everyone agrees they're going to succeed, though. Chief sceptic, unsurprisingly, is Microsoft with its vast vested interest in full-blown applications and operating systems. And a recent report from market researchers, Forrester, comes to the same conclusion. Forrester reckons the technology won't be good enough and that a fully featured PC may drop as low as $1,000 in 1997, reducing the appeal of cut-down machines. The truth is that it's a multi-billion dollar question and no-one is sure of the answer.

Ben Tisdall
Editor

Next Month

Personal Computer World

Windows NT 4.0

The next release of Microsoft's industrial strength OS arrives.

Group Test

Pentium 133s

18 *Multimedia PCs.*

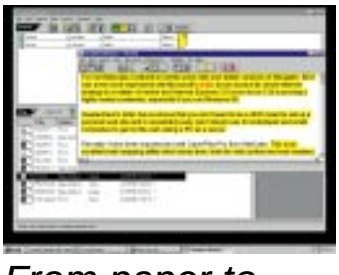
200MHz Pentiums

— the fastest yet.

Paint Packages

— all you need to be quick on the draw.

Document Management software



From paper to the PC.

New Macs

— Apple attempts to bite back.

● Special cover CD

A multimedia introduction to the Internet and Microsoft Network that doesn't need a modem. PLUS, a 30-day free trial to MSN with unlimited Internet access.

August 96 issue
— On sale Thursday 4th July

September 96 issue
— On sale Thursday 1st August

** Next month's contents subject to change.*

Enter, the age of the **listening PC**

IBM and, reportedly, Corel are to bundle voice recognition with major products. Their aim is to woo users from Microsoft but they could trigger a big shift to voice input and thus transform computing, or so thinks IBM.

The next version of OS/2 Warp, codenamed Merlin, will incorporate IBM's well-regarded VoiceType technology to give it an edge over Windows 95.

This is the first time dictation facilities have been built into an operating system, though easier voice control (which requires only a tiny vocabulary) has long been bundled with Windows.

Wally Casey, head of client product management, said: "Just as the Macintosh changed the industry when it introduced a graphical user interface, OS/2 Merlin will alter the way people interact with computers."

Corel is to bundle another successful voice system, Dragon Dictate, with WordPerfect, according to Dragon Systems.

Corel would not confirm the move but it makes sense. Corel is about to launch a new version of WordPerfect and needs to persuade the huge base of WordPerfect users not to join the drift to Microsoft Word.

The drift is due more to the overwhelming success of the Microsoft Office suite, which includes Word, than to the relative worth of the two products.

Both the Dragon and IBM systems need a sound card and 16Mb of RAM — more or less an entry-level system for Win95. IBM claims VoiceType will recognise up to 70 words per minute, with an accuracy of between 95 percent and 98 percent.

OS/2 brand manager, Nick Davis, said: "We believe this will leapfrog the technology inside Windows 95…The whole point of Merlin is to make OS/2 more accessible."

Microsoft's desktop applications manager, Oliver Roll, said: "Voice dictation technology still has a long way to go before it's accurate enough to incorporate into the operating system. I suspect the OS/2 Warp version will be largely command based. Let's wait and see how good the dictation facilities are."

But if voice facilities prove popular Microsoft could be forced to follow IBM's lead. At present it offers only a software kit to allow developers to incorporate voice recognition into Win95 applications

Jessica Hodgson

Now you're talking

"Using VoiceType is like teaching a child," says computer consultant Mark Turrell. "You have to persevere, but it's worth it." Within three days of buying IBM's voice dictation package VoiceType, Turrell had used it to compile a 15-page report.

VoiceType is quick to set up: you need to speak to it, then VoiceType programs your phonetics into the system, taking about three hours. The vocabulary in the standalone product is about 30,000 words, but you can customise it. "VoiceType is too noisy for a mass work tool," says Turrell. "But it's ideal for single offices."

Cheapest yet CD recorder

Plasmon is selling a CD recording kit for just £540. The CDR 4240 offers quad-speed read and dual-speed write in a choice of disk-at-once, multisession, track-at-once, and fixed and variable packet modes. Multimedia software is included.

Plasmon 01763 262963

Visit *PCW*'s Web page at www.vnu.com/hc/pcw for a news update.

Mobiles could be grounded

Manufacturers seem at last to be making true mobiles but are bafflingly loth to sell them. The NEC model, pictured, is interesting both for its size, which is between that of a finger-crippling organiser and a notebook, and for the fact that NEC is unsure whether to let it out of Japan.

NEC describes it as a portable email machine. Toshiba has brought out a smaller model, the Libretto, but again is unsure whether to export it. Our man in the US, Tim Bajarin, has seen both and raves about the Libretto but was disappointed that the NEC runs on DOS (see *Analysis*, pages 34 and 36).

Toshiba UK representatives, who visited *PCW* to show off their flash, new, zoomed-video notebook made no mention of the Libretto. IBM showed us its beautiful, slimline, Thinkpad 560 which can have a 12.1in SVGA colour screen and 133MHz Pentium chip. But at 4lb, and starting at £2,400, it is too heavy and too expensive for a mobile.

Clive Akass

Friendly NT sends out shockwaves

Microsoft has sent out 200,000 late beta copies of the long-awaited Windows NT 4.0, which could have more impact than Win95.

Many companies have held back from Win95 upgrades to await NT 4.0's launch this summer. The new enterprise-level operating system has a '95 interface, allowing the same look and feel from desktop to back-office.

Some will skip Win95 in favour of NT, which has both desktop and server versions. In fact NT, rather than '95, is said to be Microsoft's path to the future.

A drift to NT could hit Intel because it runs on rival PowerPC, MIPs, and DEC Alpha chips as well as on the x86 dynasty.

Unix still rules in very big systems, where change is slow and sure, and NT is seen as being out of its depth. But defections are rising and NT 4.0 has forced a closing of ranks in the fragmented Unix community.

At a Unix press conference at Comdex, heavyweights from seven major Unix houses stood up to declare their undying faith in SCO's Unixware for Intel.

But the presence of Compaq, Data General, ICL, NCR, Unisys Olivetti, and Siemens could not hide the fact that IBM, H-P and Sun back their own Unix brands.

Unix is not about to die. Unixware, recently shed by Novell, is to get tighter links to Netware, still by far the most used local net software. And H-P and SCO could come together for a 64-bit Unix to run on the P7, the chip H-P is developing with Intel. (see *Tim Bajarin Reports*, page21).

Clive Akass

What's the big IDEA?

The designs shown here may be where the industry is going: PCs in everything. They come from a California start-up called Diba, headed by Farzard Dibachi who designed Oracle's network PC for Larry Ellison.

Dibachi calls them IDEAs (interactive digital electronic appliances) and they are a marriage of computer and household goods: the phone (*shown, top*) doubles as an email terminal, and the remote-control (*far right*) turns your TV into a Web browser. Neatest is the recipe book (*right*), designed to be mounted under a shelf or cabinet in the kitchen, to provide cooking and nutritional information.

Dina 001 415 596 1177; www.diba.com

Governments warn of millenium madness

The US and UK governments issued a warning last month about the "millenium bomb" in systems that store dates as two figures rather than four.

This saves a byte of memory per date, which is fine until the century changes, when 00 will be interpreted as 1900 rather than 2000. Other errors may stem from trying to subtract 99 from zero.

IT managers questioned for a survey put the *average* cost to a large company at £10 million — but fewer than one in ten have done anything about it. Only 15 percent of senior managers are aware of the problem, says the survey by the DTI, the CTTA, PA Consulting and the Computing Services and Software Association.

Technology Minister, Ian Taylor, warned of a "serious threat to business". And US Congressman Steve Horn said after a special hearing on the problem: "We have an immovable deadline."

Details at www.cssa.co.uk/cssa

Wretched computer ordered me this as my new company car...

Short Stories

Morgan offshoot

● Morgan's, famous for its end-of-line bargains, has formed a division called Megatron to sell new PCs from Taiwan-based DTK.

Prices range from £799 (excl. VAT) for a multimedia PC based on a Cyrix 5x86, to £1,699 for a 166MHz Pentium Tower.

Megatron 0121 454 8700

NSPCC-saver

● A screensaver in aid of the NSPCC is available at www.microsoft.com/uk/nspcc following a collaboration with Microsoft.

Web bargain

● Tandy is to sell one of the cheapest Internet bundles yet at a flat £79.99 a year including VAT and software.

The service was set up by Internexus for Energis, which uses a fibre-optic network that piggy-backs on the UK electricity grid. Local rate connections are available all over Britain.

RAM retreads firm gets no thanks for the memory

Finance markets last month took a dim view of a superficially flawless way to boost world memory production by up to 40 percent — potentially a $20bn-a-year industry.

One reason RAM prices are so high is that up to six in ten chips are discarded as defective. The Memory Corporation, in Scotland, makes what amounts to RAM retreads, in which defective addresses are remapped to good ones (*see caption*). It attracted a lot of interest and shares peaked last year at 554p but plunged after poor sales. Last month they fell 37p to 133p after a disappointing forecast. But MD, Cameron McColl, predicted great interest in the latest modules. These include 60ns and 70ns fast-page SIMMs suitable for use with Triton-chipped Pentiums. EDO and SDRAM modules are expected this year.

If the production cost is reflected in Memory's prices, which are only ten percent below those of standard RAM, the operation would be vulnerable to market swings. Also, the Scottish plant is set up to produce only 6,000 modules a month. McColl said: "The production line is designed to be scalable. We can ramp up production very quickly."

Clive Akass

VCM (DEALERS) 01604 859333

● *See analysis page 35*

Top and bottom views of an early 16Mb RAM retread, or Variance Controlled Memory (VCM) module. The upper surface has nine 2Mb chips; the extra one is to cover dud cells. The smaller lump on the lower surface is an EEPROM, storing addresses of defective cells. The large lump is a custom chip containing redirection logic and 300,000 spare memory cells. Later versions have more spare cells and dispense with the extra RAM chip.

Acrobat set to be WYSIWOG king

Adobe has pitched the new Acrobat 3.0 to become a *de facto* standard for WYSIWOG (what you see is what others get) publishing on or off the Web.

Acrobat 3.0 is also packaged for managing and storing scanned documents.

Acrobat was one of the first products to offer a way of making documents look the same on any platform. But Adobe made a big mistake in charging for the first Acrobat reader, thus ensuring that its Portable Document Format (PDF) would not become an instant global standard.

WYSIWOG became an issue with the explosion of Web publishing, because HTML-based Web pages look different on different machines.

Major browsers already support PDF files, which can contain hypertext links, and Adobe has launched PageMill and Sitemill for creating and managing Web sites. The most important new feature of Acrobat 3.0 is that it will come with utilities that were previously expensive add-ons. These include:

● *Distiller;* for translating into PDF the output of any postscript-enabled word processor or publishing package.

● *Capture;* which will OCR a scanned document and store it as a PDF file. This lets you store documents as both image and searchable text. Optionally, it will also store a bitmap, for legal fallback.

● *Catalog*; indexes and searches PDF files.

New features include interactive forms, embedded controls in PDF files, page by page downloading, and progressive rendering of text, links, images and fonts. No price had been set as we went to press but Adobe said it would be "above £90 and below £400."

Clive Akass

Adobe 0181 606 4000

Microsoft and Adobe are collaborating on a universal font format which will end the font-format wars. The new Open Type format combines TrueType and Type 1 technologies, and includes compression for efficient Web use.

Microsoft and Adobe will cross license Type-1 and TrueType to each other and make the OpenType specification available to others. Acrobat 3.0 and the next version of Windows will support OpenType, which is claimed to be 100 percent compatible with existing Type-1 and TrueType fonts. See next month's *Hands On Graphics and DTP* for details.

Gordon Laing

Tim Bajarin reports from the U.S.

It is two years since Intel announced a joint development, with Hewlett-Packard, of a 64-bit VLIW (very long instruction word) processor codenamed the Merced, aka the P7.

Due out in1998, Merced will not be true VLIW. Rather it refines the Pentium Pro's technique of decoding instructions into "micro-operations" for simultaneous execution.

One goal is to use instruction-level parallelism as much as possible. A second is to use pre-decoding and tagging to create a correspondence between micro-op streams and the chip's functional units.

There will be special decoders for x86 and HP-PA instructions and a new compiler will maximise 64-bit performance.

Happy Valley

● It was said last year that Silicon Valley's glory days were over. But new figures show that $12.7bn in profit pulsed through the Valley in1995 from its top 150 public companies. No wonder the venture capitalists are smiling.

Internet hype is still helping some firms to make a killing. Yahoo! closed its first day as a public company with a book value of $800m; and it has yet to make a penny profit. This was just a week after Lycos, another search engine company, doubled its value in its first day of trading.

Notebook split

● I recently visited Compaq and had lunch with CEO, Eckhard Pfeiffer. He spoke of Compaq's success in selling high-end server systems helped by a 300 percent growth in sales of Microsoft NT server products in 1995.

Compaq staff told me about their new notebooks. There will be two new models for power users and at least one ultra-slim model for people willing to sacrifice features for portability.

Most notebook makers now see the market splitting into these two groups.

Short Stories

Troubled Netcom launches in UK

● US provider, Netcom, denied that it was "running away" from failure in the States by launching into Britain.

Netcom stocks on Wall Street fell four points between 1st February and last month's UK launch. Last year Netcom posted record first quarter revenues, but still had a net loss of $1.3m.

Chairman, David Garrison, said: "We want 50 percent of Netcom revenue to come from outside the US in the next five years."

Netcom offers national local-call access with 24-hour support and no start-up fee for a fixed £12.75 a month excluding VAT. Faced with AOL's monthly charge of £5.95, and without any content, Netcom will have to pull out all the stops.

Netcom 01344 395 500"

Jessica Hodgson

Report predicts Notes decline

● Lotus Notes has just two years left as the dominant groupware product, states an Input report.

It will have 18 million users by late 1998, compared with nine million users of other Web products such as WebShare and Workflow Metro.

By then, these will be catching up with Notes on functions, and Notes will have become fully Web aware, but competing with products written from the bottom up, for the Web.

Input analyst, James Eibisch, believes there is a shift to Web-based applications from those tied to a particular hardware and operating system. He said: "Notes is in the first wave of this shift."

Input 01753 530444; www.input.com

Check IT more

● WinCheckIT developer, Touchstone, has released the £129 CheckIT Diagnostic Kit to troubleshoot both PC hardware and software under Win95, Win3.1 and DOS.

Touchstone 0181 875 4456

Pipex boosts access speed as **MSN** relaunches on the Web

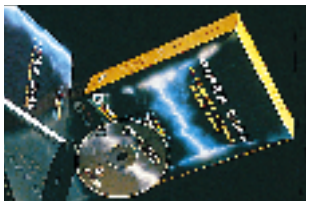
Competition in the crowded UK Internet market reached fever pitch last month with three major moves.

One; Netcom became the latest US provider to set up shop in Britain (*see Short Stories, left*).

Two; Pipex announced that it has boosted its links to support an unofficial extension to the V34 standard, raising the fastest data transfer rate by 16 percent, from 28.8Kb/sec to 33.6Kb/sec (*see below*).

Paul Rivers, head of dial-up services, claimed this made Pipex the world's fast national dial-up network. He also announced an upgrade to Pipex's dial up software (*see picture*).

Three; Microsoft finally launched its Internet capability



on the Microsoft Network (MSN), together with a revamped interface. MSN now offers Web links at 28.8Kb/sec at local rates from anywhere in Britain.

Microsoft officials freely admit the company screwed up its online policy last year, when it tried to promote a proprietary closed network.

It has completely scrapped the UK infrastructure set up last year for the launch of MSN with Windows 95. It now uses Pipex links, and so is competing with its own provider, albeit in a different market.

MSN, in addition to time-based charges for small users, offers a flat-rate service at £14.95 a month; just 5p less than Pipex. But it offers much more CompuServe-style value added content in the way of online magazines, specialist areas and information sources.

This may be why Pipex chose to jump the gun on the V.34 extension, which will not be available to MSN users until later this year.

Pipex also said users will now be able to access their mail from anywhere in the world, which is another selling point for a global service such as MSN.

Clive Akass

Pipex 0500 474739; MSN 0345 002000

Buyers face new modems tangle

Pipex's decision to back the unofficial V.34 extension (*see above*) means yet more confusion for modem buyers. It looks like a re-run of V.Fast, the unofficial 28.8Kb/sec specification used by some modem makers before V.34 was ratified. Many V.Fast models only worked fully with others of the same make.

V.34 was supposed to be the final standard, hitting the theoretical limit for bit-rates on standard phone lines. But refinements allowing 33.6Kb/sec were being mooted even as it was ratified.

Pipex could adjust easily to 33.6Kb/sec because its US Robotics modems are software upgradable. USR Courier's latest best-selling USR Sportsters already support the extension.

However, other modem makers like Hayes, Motorola and Pace are waiting until the extension is ratified, possibly in October. Pace technical director, Derek Oliver, said a lot of fine tuning was necessary to get models of all makes working with each other when a new standard is ratified.

He said: "I am very sceptical of software upgrades. They are useless if there is a hardware change to be made… But as soon as the V.34 extension is ratified we will have a product."

Motorola 01293 404343; USR 01734 228200; Pace 01274 532000; Hayes 01252 775577

Paging all notebooks

This pager can be used either as a standalone or with a notebook, plugged into the PC Card slot top provide messaging services all over Europe. The US designer, Socket, says it is the result of 12 months of collaboration with Euro messaging providers. It is available with software for PCs, the Apple Newton and MacOS-based PowerBook, and Hewlett-Packard LX palmtops. There is also a software kit for developing applications.

London Pager 0181 343 9393

Short Stories

Excel gets on the AA road map

● The mapping facilities in the latest version of Excel can be enhanced with a £90 package from Kingswood, based on the AA digital map dataset. Excel can use the information to display data in a geographical context.

● The Mathworks has announced Excel Link, which allows MathLab users to integrate data from Excel spreadsheets.

Kingswood 0181 994 5404; Mathworks 01223 462244

Hayes logs off Chapter 11

● Modem pioneer, Hayes, put 18 months' of financial problems behind it with news that it has emerged from Chapter 11, a form of bankruptcy protection, having paid off all its creditors with the aid of a $70m credit deal.

It has fought off takeover bids by Diamond Multimedia and US Robotics and has seen one rescue package collapse since it hit severe cash-flow problems in late 1994 — caused, ironically, by demand outstripping supply.

Hayes, originator of the command set used by most modems, made $6m profit on $77.2m sales for the 1996 first quarter.

Hayes 01252 775500; www.hayes.com

Use your video to back up your PC

● A very cheap device, which is said to allow you to use a video-recorder to back up your hard disk, has been developed by Cheshire-based Danmere.

The £34 Baker is an 8-bit ISA card with software that will pack 1.5Gb on to a three-hour tape. It will be reviewed in *PCW* next month.

Danmere 01606 74330

Company raises Cain over rival Web names service

A move to hive-off the registration of Web addresses in Britain has led to mud-slinging between two companies and an accusation of sabotage.

Registration used to be run by Government-funded UKERNA, which manages JANET, the UK academic branch of the Internet. In April, UKERNA set up a not-for-profit company called Nominet to manage the task. This decided to set a £50 annual charge for registration, which was previously free.

Some internet providers objected and on 30th April a company called NomiNation was launched charging £5 to register a name, plus £20 per year.

The NomiNation server went down on 10th May having been flooded with Internet data. The source was traced to a former student account, at Southampton University, in the name of Chris Cain, director designate of Nominet. Justin Clements, MD of Mailbox Internet which provides facilities for NomiNation said: "At the time we believed ourselves to be the victims of a malicious attack."

Cain denied launching an attack. He said: "I was interested to see how the NomiNation server was connected to the rest of the Internet. In the process of checking bandwidth, you need to momentarily overload the circuit to check the return traffic. I was called away in the middle of this and the server was flooded for about 30 minutes."

Nominet chairman, Dr Willie Black, said he did not believe there was a deliberate sabotage. But Dr Tim Chown, of Southampton University commented: "It's very hard to do it accidentally."

Cain's account at the university has been suspended. He complains that NomiNation's name is too close to NomiNet's and that the company runs two name servers on the same connection.

NomiNation chairman, Stephen Dyer, said: "We are offering a much cheaper service, and this has upset a lot of the cosy little cartels."

Jessica Hodgson

Vendors welcome plan to provide schools with PCs

A plan to spend £125m on 250,000 PCs for schools has been welcomed by vendors. The provisional budget prices the PCs at £500 each.

An unnamed Minister told the *Financial Times* that companies may be expected to donate kit: "We are offering a tremendous opportunity here for manufacturers to massively expand their market." The Cabinet Office stated that no manufacturers had yet been given a brief.

Labour is setting up a committee to look into IT in education and points out that half the computers in primary schools, and a third in secondary schools, are more than six years old.

Brendan O'Sullivan, MD of Xemplar, a company set up by Apple and Acorn to exploit the education market, said: "Making a fast decision to dump 250,000 PCs into the school arena could do more harm than good."

Acorn's Kevin Coleman said: "We certainly believe £500 is a realistic price point."

But O'Sullivan stated that it would only cover the cost of cut-down network PCs, which might not be suitable for some schools. Primary and secondary schools needed computers for different reasons. He said: "The Government needs to match the technology to suit the schools."

Coleman commented that Acorn's Pocket Book, based on the Psion 3a, was a good choice for secondary pupils, as it allows data on field work to be collected easily. "It's the mix of technology that's important, not just having the technology. The concern I have is that people will just dump old products into the educational marketplace."

Jessica Hodgson

Xemplar 01223 724200

Dataphone price Pacesetter

UK modem specialist, Pace, is offering this mobile dataphone card for just £249 (excl. VAT), or £349 including the phone. The Microlin GSM data card is compatible with the Panasonic G400 and BT Roamer 7 phones, as well as the Microlin model pictured. It comes with fax and comms software and Vodafone Business Extra connection.

Pace 0990 561001; Hugh Symons (dealer) 01202 740853

Short Stories

Webbed feat

● Microsystems Software has announced its Web Scheduler which lets you access its CaLANder scheduler over the Web.

You can try it on calweb.calendar.com:8080. You have to select from one of two user names: twain, mark; or sawyer, tom. Respective passwords are twain and sawyer.

Microsystems 01344 874111

Brother first

● Brother showed what it claims to be the first colour inkjet word processor. The LW-750iC comes with the GEOS palmtop operating system built in, plus a spreadsheet, and drawing and address book facilities. The LW-750iC costs £749 (plus VAT).

Brother 0161 330 6531

Monitor TV

● Nokia has launched the 417TV, a monitor that switches to a colour TV at the touch of a button, without the need for a software driver.

The 417TV is operated by a handset, which contains a "drawer" with buttons for textual applications.

Imago Micro 01635 861122

Phone video

● Vizitel's ScreenShare enables voice and interactive image communication over any Windows application across standard phone lines.

Catalyst Communications 01734 886922

Tough customer

● Dolch claims its Notepac is the world's toughest notebook.

Sales manager, Mike Kennet, said that driving a car over the machine, or pouring water into the keyboard, would fail to damage it. The 100MHz DX4-based Notepac costs from £7,000.

Dolch Computer Systems 01908 263622

CD drives hit ten-speed

Pioneer and Pinnacle have both announced ten-speed CD-ROM drives which spin data off at 1.5Mb/sec — the fastest yet.

The Pinnacle drive is essentially a speeded-up eight-speed, but the Pioneer introduces technology allowing an access rate of 80ms, getting close to that of a slow hard-disk.

It offers two modes. The faster Constant Angular Velocity (CAV) is like that used in hard drives, where the rotation rate is constant but the linear velocity (how fast the head moves over the tracks) varies with position.

This speeds up mean access times, but the data transfer rate slows to 660Kb/sec towards the centre of the disk.

CAV mode is good for tasks such as accessing text archives, where access speed is more important than transfer rate.

Most CD drives use Constant Linear Velocity (CLV) mode, by which the data transfer rate is constant but access times are slower. This can be preferable for tasks such as video delivery, where steady fast data transfer is more important than access speed.

The Pioneer drive provides the option of a mixed CAB/CLV mode, with an access time of the order of 150ms and a sustained transfer rate of 1.5Mb/sec.

The Pioneer Super 10x drive costs £199 with an ATAPI interface and £250 for the SCSI version. The Pinnacle 10Xtreme drive is expected to cost about £250 for an internal IDFE version.

Pioneer 01753 789789;
Pinnacle (31) 20 653 4949

Stand by for bandwidth by the gigabyte, says TI

Computing is on the verge of its third major paradigm shift, said Texas Instruments mobile computing guru Dr Pallab K. Chatterjee in a Comdex keynote address. He commented that the first shift, from mainframes to the PC, came as the cost of chips fell and people asked the question: "What if silicon were free?"

The next shift, to the graphical interface, came as the cost of MIPs (millions of processor instructions per second) fell and people asked: "What if processing power were free?" Now, said Chatterjee, president of TI's personal productivity products, the networked society is being launched by the question: "What if bandwidth were free?"

Cheap memory and processors fuelled the first two great shifts and the powerhouse of the third will be the digital signal processor (DSP), which is optimised to cope with audio-visual data. "We're close to delivering 1Gb/sec over a single fibre channel. At that speed, fibre can deliver a million channels of TV, concurrently," he said. He believed the initial use would be for teleworking. "Companies are finding it economical to let some employees work at home." He predicted that the price of LCD screens, which account for much of the cost of a notebook, will drop to the level of standard monitors.

Parallel universe

If you don't feel up to joining the networked society yet, and need a cheap and cheerful way to connect PCs, Nighthawk's new Netbox allows up to four PCs to share two printers and exchange files with each other via the parallel port under Win95 or Windows for Workgroups. It lists at £165, but can be bought for less.

Nighthawk 01789 540881

● Comdex special report ●

Slow start for the first Comdex UK

The first Comdex UK was a modest affair, with no mega-star speakers, and relatively few exhibitors or visitors. But organisers, Softbank, had pitched for corporate buyers and IT professionals and were not looking for crowds. Some exhibitors said they were disappointed and there was talk that the first Comdex UK would be the last. But Softbank called it a success and said it would be back with a new show next year.

Comdex UK showed at the very least that Britain has a need for this kind of show. When it works, Comdex is rather more than just a platform for new products: it is a talking shop and a meeting place; somewhere to learn and exchange ideas.

Among the Comdex launches featured here are two we considered to be co-stars of the show: the Pioneer ten-speed CD (*opposite*), and the Casio digital camera (*below*).

Clive Akass

Casio clicks the digicam price barrier

Casio's new QV-10a camera offers good-quality digital colour photography for the first time at a price approaching consumer level. It costs £400: a full £100 less than the earlier QV-10 even though it packs more features.

Superficially, it looks like a point-and-click Boots special and indeed it is fully automatic. Its 16Mbit flash memory holds up to 96 pictures — individual frames can be erased and written over out of sequence, unlike on the Chinon E-3200, which costs twice the price.

Uniquely for a device of this price, the QV-10a has an LCD viewing screen at the rear. The definition is only 320 x 240, which is boosted to 640 x 480 — far from print-quality, but well good enough for snapshots, identity pictures, or Web pages

Pictures can be downloaded to a PC via the serial port, or to a TV or video recorder fitted with a SCART socket. Other new features include facilities to swap pictures between cameras, and to hide selected stored pictures (the mind boggles as to what this might be used for).

Kodak showed its DC-50, a higher-resolution version of Chinon's EZ-3200.

Canon offered its PowerShot 600, which can store between 200 and 900 pictures on a 170Mb hard disk in a built-in PC Card slot.

The disk can, of course, be used to transfer the pictures to a PC, thus avoiding a time-consuming serial download. It is expected to cost less than £900.

Canon 0181-773-6000;
Kodak 01442 6112

Clive Akass

Video editing for the desktop

Fast has launched what it says is a professional-level video editing kit for £999 (excl. VAT). The AV Master board uses PCI bus mastering to give fast video data rates.

Video and audio signals are locked to ensure synchronisation. The suite comes with the latest 32-bit Media Studio 2.5 for Windows 95.

Fast 0181 968 0411

DragonDictate cuts through noise

Dragon Systems showed the latest version 2.0 of its DragonDictate for Windows voice-recognition software. It claims to have ironed out many of the problems which curbed interest in the technology.

DragonDictate 2.0 can now work in up to 100dB of background noise. It can distinguish, from context, words with identical pronunciation and different spellings such as Wright, right, write and rite. WordPerfect now bundles DragonDictate with its products.

Dual technology's notebook computers can be voice-enabled, allowing you to dictate, send email and control CD-ROM presentations by voice.

Dragon Systems 01242 678581

Short Stories

New notebooks get fast Pentiums

● **Texas Instruments** has added two 100MHz Pentium colour notebooks to its range. The £2,195 Extensa 570CD and the £2,595 570CDT come with a 1Gb hard disk and CD-ROM.

Sharp's latest Pentium notebooks (*above*) focus on display and sound. The 133MHz PC-9070 features an SVGA 800 x 600 TFT display, capable of 65,536 colours.

The 120MHz PC-9040 comes with a 16-bit Soundblaster-Pro compatible soundcard, a 1.1Gb removable hard drive and six-speed CD drive.

NEC has cut the price of its top-end Versa 4000 range for the second time this year by a total of almost 30 percent.

This takes the price of a Versa 4080H, with a 1Gb hard disk, from £3,995 to £3,295.

Dual Technology's notebooks can now be voice-enabled. The PMDIII comes with Kurzweil Voice for Windows, as standard.

NEC 0181 993 8111;
Dual 01223 576622;
Texas Instruments 01784 212746;
Sharp 0800 262958

Autodesk spin-off ships 3D apps

● Autodesk has launched a new division, called Kinetix, to target 3D technology at a range of new markets, including professional video and animation, and Web publishing.

Kinetix is shipping 3D Studio Max, a 3D modelling and animation application running under Windows NT, and Hyperwire, an icon-based Web authoring tool that creates 2D and 3D titles in a Java environment.

Autodesk 01483 303322

Short Stories

Web boom as UK tops PC league

● Britain has Europe's highest proportion of homes with a PC, says a new report from Olivetti. Nearly one in three UK homes owns one, compared with 21 percent in France, and 20 percent in Germany.

Another report, from IDC, says Britain will have 7.7million Web users by the year 2000. Author, Kathy Burrows, predicts that the big money over the next year will be in intranets, followed by net security and information content.

She warned: "The small Internet providers will either be acquired, or will have to merge because the margins being made are very small."

HeLp is here

● L-drivers, fearful of the new written theory part of the Test, can find tips and a mock test at BSM's web site at http://www.bsm.co.uk

Silicon in Soho

● Silicon Graphics has opened a £2m studio in Soho, London, to train people in digital authoring and production. Equipment includes 25 Indigo2 IMPACT workstations.

Silicon Studio 0171 478 5000
www.studio.sgi.com/Training/London.html

Visioneer clone

● The Sicos DMS 2000 scanner comes with desktop-level document management software unashamedly aping the successful Visioneer pack at less than half the price. You can find it for as little as £99.

Eurebis 001 353 1456 9383 (Dublin)

EZ-135 upgrade pitched as new superfloppy standard

Syquest has announced what it is pleased to call a new standard for a Power Disk Cartridge(PDC) in a bid to regain the initiative in the booming but confused superfloppy market.

PDC provides an upgrade path from Syquest's 135Mb EZ-135 drive, providing initially for backward-compatible 540Mb and 230Mb drives but guaranteeing larger capacities — all at hard-disk speeds.

The EZ-135 was rushed out as an answer to Iomega's Zip, which is not compatible with its new 1Gb sibling Jaz drive (see *First Impressions*). The EZ-135 is likewise incompatible with Syquest's answer to the Jaz, the 1.3Gb SyJet, due next month.

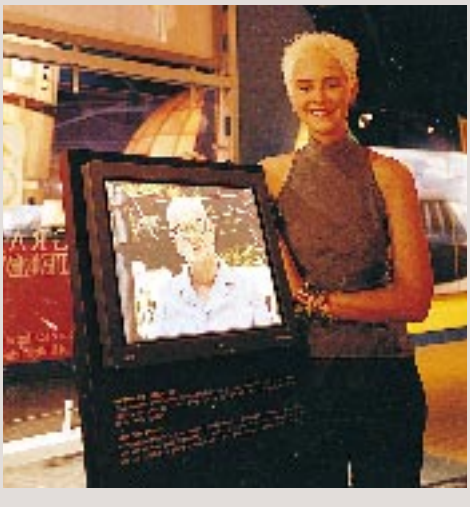
Worse, from Syquest's point of view, is the fact that the PDC is not compatible with the 40Mb-200Mb drives that the company did manage to establish as the medium of choice for print shops. Kao, Maxell, Polaroid and Xyratex (*see above*) are committed to making PDC products.

None of these removables is compatible with "Ye Olde 3.5in floppy" — but a new 120Mb superfloppy from Compaq is. How much of a selling point this is remains to be seen, with 3.5in floppy drives at ten-a-penny and Compaq reportedly having to sacrifice performance for compatibility. Initially, it will only be available installed in machines.

Xyratex 01705 498851; Syquest 01624 362266; Iomega 0800 973194

Xyratex's new Maxit drive takes 540Mb cartridges and can read Syquest 270Mb cartridges. Xyratex was saying, as we went to press, that it would be made PDC-compatible within a couple of months. The recommended price is £399 (excl. VAT) and cartridges will cost about £54.

Off the wall



On-screen, futurologist Arthur C. Clarke, shows off Fujitsu's new Plasmavision, the kind of monitor people may hang on their walls some day. He was opening, via a live satellite link from Sri Lanka, the Futurevision exhibition at Granada Studios in Manchester which demonstrates the convergence of broadcasting, multimedia and computing.

Granada Studios hot-line 0161 832 4999

Microsoft buys British, *again*

Microsoft has bought shares in Oxford-based Helicon five months after selling its 18 percent stake in another UK multimedia company, Dorling Kindersley. Helicon owns Hutchinson, publisher of the Multimedia Encyclopedia — a major competitor of Microsoft's Encarta.

Helicon's Bridget McLeod said: "We are delighted. The Microsoft money allows us to do things we haven't been able to do for ages. The initial idea behind Helicon was to publish up-to-date reference material of the first rate. We can now make sure our resources are of the best quality, take on good contributors and generally bring things up-to-date."

Both products will now be in "friendly but aggressive competition" but will share editorial resources. They each cost £49.99, and are targeted at different markets. "Encarta has more basic text for each reference, Hutchinson has more references. Hutchinson is truly British-compiled in a way that Encarta will never be," said McLeod.

Jessica Hodgson

Microsoft 0345 002000; Helicon 01865 204204

Quicktime boosts Apple's fortunes

Apple's Quicktime plug-in will be included in the new Netscape Navigator 3.0 browser, under a deal which is expected to boost the use of video on the Web.

Apple has created a Quicktime VR extension to facilitate the creation and use of virtual 3D environments on the Web.

Apple executives in charge of Quicktime laid out their strategy for me recently, writes Tim Bajarin. Quicktime is already a robust technology used for multimedia elements for the Mac OS or Windows. To date it has been used mostly on CD-ROMs.

Apple has been working to extend its use to the Internet and is just about ready to ship its plug-ins. About ten beta sites are starting to deliver Quicktime movies. Once the final technology ships, during the next 60 days, you can expect to see thousands of Web sites using it to deliver movies, 3D images and enhanced audio.

This could change the nature of the Web almost over night and adds another dimension to Apple's position in the Internet market, where it already claims 40 percent of the servers.

Microsoft's competing Active Movie is not even close to being commercial. And, Apple is delivering these Quicktime plug-in's in both Mac and Windows formats simultaneously. (By the way, these movies are based on MPEG 1, with MPEG 2 probably not supported until late 1997).

The addition of Quicktime movies being delivered over the Net is hot and Apple can be proud to be a major supplier of this technology for the Internet community.

Netscape Navigator 3.0 can be downloaded from http://homenetscape.com; a beta of the Quicktime VR extension is available at qtvr.quicktime.apple.com

Mac clones for UK

IMC is to launch a PowerPC range running the Mac OS. The machines are made by scanner specialist, Umax, which bought Radius's MacOS systems division.

The first model, due this month, will be a high-end graphics workstation costing about £3,000. A mid-range model costing about £1,600 will ship next month and a sub-£1,000 consumer model is expected in the autumn.

IMC, a digital imaging specialist, has formed a division called IMC Computer to sell the range.

IMC 01344 872800

Top 10 Peripherals

	Product	Manufacturer	Last month
1	Quadspeed CD-ROM Drive	Goldstar	1
2	Epson Stylus Colour II Printer	Epson	2
3	Online Internet Modem	Motorola	4
4	Epson Stylus Colour IIs Printer	Epson	-
5	SoundBlaster 16 Value	Creative Labs	7
6	850MB IDE Hark Disk Kit	Western Digital	5
7	Primax Colour Mobile	Primax	-
8	Motorola 3400 Pro	Motorola	-
9	MS Home Mouse	Microsoft	9
10	PaperEase	Primax	6

Top 10 DOS

1	Flight Simulator v5.1	Microsoft	2
2	Norton Pc Anywhere v.5	Symantec	7
3	Wordstar v6.0	Softkey	2
4	MS DOS v6.22 U/G	Microsoft	-
5	Pegasus Solo Payroll	Pegasus	-
6	Windows For Workgroups 3.11	Microsoft	-
7	386 MAX v7	Qualitas	-
8	Turbo C++ v3.0	Borland	-
9	Supercalc v5.5	Computer Assocs	-
10	Sterling Payroll	Sage	4

Top 20 Windows

	Product	Manufacturer	Last month
1	Encarta 96	Microsoft	1
2	Windows 95 U/G	Microsoft	4
3	TurboCAD 2D/3D	IMSI	2
4	MS Office 4.2 U/G	Microsoft	5
5	First Aid for Win95	RMG	4
6	Cleansweep 95	Quarterdeck	10
7	Masterclips Prem. Collectn. 35,000	IMSI	-
8	MS AutoRoute Exp UK & IRE	Microsoft	6
9	MS Office 95	Microsoft	18
10	MS Office Pro 95	Microsoft	10
11	MS Plus	Microsoft	11
12	Dr Solomons Anti Virus Qrtly '95	S&S Intl.	14
13	QEMM 8	Quarterdeck	7
14	Pass Your GCSE Maths	Mathsoft	3
15	Quickview Plus for Win 3.1	Inso	15
16	Uninstaller 3.5	RMG	12
17	Quickbooks v3	Intuit	-
18	Page Plus Home/Office	Serif	16
19	Dr Solomons Anti Virus Qrtly	S&S Intl.	14
20	MS Office Pro 4.3	Microsoft	8

Figures supplied by Software Warehouse and relate to bestsellers for April 1996.

Short Stories

Stop, thief!

● One answer to Mac thefts is this stainless-steel clamp, described as "cost effective" at £135 (plus VAT).

Granville Row 01799 513344

Mac DOS board

● Reply will next month ship Pentium-based DOS boards that fit into PCI slots in Power Mac 7200, 7500, 8500 and 9500 models. Base price for a board with no silicon will be around £400.

Reply 0181 832 8300

Time logger

● Mac users who charge for time spent on a project can use a new £99 package from Hi Resolution. Watchit! logs who spends how long on what file using which application, then produces a report.

Hi Resolution 01892 891291

French dictionary

● The Collins French Dictionary with 555,000 translations is available from Harpur Collins at £49 (plus VAT) on IBM compatible CD only.

HarperCollins 01903 873555

Online survey

● Ulster University wants anyone interested in electronic information commerce to participate in a survey at survey.infj.ukst.ac.uk.

Newsprint welcomes feedback. Send your news and views to clive_akass@pcw.ccmail.compuserve.com or fax them to 0171 316 9313

Near notebook nirvana

A mini sub-notebook, newly available in Japan, holds worldwide potential — but will they let it out?

I am tired of carrying around a four or 5lb notebook when all I want to use it for is writing and email. I don't want all the power of my desktop with me everywhere I go — I want a mobile email machine.

The feeling struck me even more forcibly after I acquired the new Megahertz Allpoints wireless modem and connected it to Wynd Mail, a great service for wireless email. The ability to send faxes, email, pages and even phone messages, any time, anywhere, has leant a lot of power and flexibility to my business life.

I have become a wireless communications addict: I was recently skiing in Tahoe when I got an alpha page from a client asking me an important question. While riding on the ski lift, I just pulled out my Allpoints-equipped Newton and faxed the answer to my client's paged message.

The Wynd email service will use a computerised voice to read out a typed message if the recipient is equipped only with a voice phone, which came in handy when I had to warn my mother that I would be late.

This brings me back to the need for a small notebook with a decent screen and keyboard you can really use for typing. I've had various discussions with notebook makers, suggesting that they create one but they argue that users want more, rather than less, power in their notebooks.

I am convinced that they are missing a real opportunity. So, when Toshiba recently introduced a mini sub-notebook in Japan, I really took notice. Called the Libretto 20, it weighs in at 1.7 lbs and is about 8ins long and 6ins wide. It has a 6.1in colour 640 X 480 VGA TFT screen and a real keyboard that a touch typist can use.

It uses a lithium-ion battery providing at least three hours of use, unplugged, a 270Mb, 2.5in hard drive, an AMD 486DX 75 processor and 8Mb of DRAM and runs Windows 95. Also included is an IRDA-compatible infra-red port, serial and printer ports and one Type II PC Card slot. Although the 486DX 75 is slow for running Windows 95, it does work. More importantly, a low-powered computer like this is fine for writing and email. In Japan, it sells for 198,000 Yen (or about US$1,980).

I am very excited about this computer and would like to have one. There is only one problem: Toshiba is unsure whether or not to bring the machine to the US, Asia or Europe. In fact, Toshiba estimates only modest sales of 150,000 units before next March.

I think this estimate is too low, especially if Toshiba releases it in other markets. In the US alone, there are over 15 million professional notebook users. For many of these, email is the killer application. In fact, Lotus Notes and its functionality demonstrates how email can increase productivity. And, with voicemail-hell being one of the most inefficient ways to communicate, email has become the most important form of business communication since the invention of the telephone.

That is why many analysts are watching the Libretto very closely. And many notebook vendors have told their Japanese associates to buy a Libretto 20 and check it out. They, too, are very interested in this machine and will be watching closely to see if it takes off in Japan and whether Toshiba takes the plunge and brings it to the US.

My view is that given Internet access, the Libretto has a lot of potential outside Japan.

Tim Bajarin

This new pen-driven NEC portable is another mobile the Japanese are keeping to themselves.

Power to your notebook

More news of interest to mobile users came last month from IBM, where researchers have designed a new hard drive for notebooks with a data density of 1Gb per square inch — a long-time target of component designers.

IBM says it will soon begin selling drives, made from this technology, to PC manufacturers. They will have a capacity ranging from 1.08Gb to 2.16Gb.

This is good news for users who are migrating to notebooks as replacements for their desktops — a trend that has kicked in now that Pentiums, which draw little electrical power, have become available.

In fact, Intel sources say we will have a 150 MHz Pentium for portables by the Autumn, providing users with the option of having just about as much power on a notebook, as they could get on a desktop machine.

When the chips are down

The sharp drop in the price of RAM has exposed the instability of the chip making industry.

EARLIER THIS YEAR, WE saw the price of RAM drop sharply, returning the balance of power to the buyer after more than two years of tight supply.

There were two major reasons for the sudden change. Firstly, Windows 95 didn't sell in the numbers expected and second, not enough PCs found their way into Christmas wrapping paper at the end of last year. The result was that memory manufacturers found themselves with an outrageous glut of RAM chips.

This series of events exposed the instability of the chip making industry and its obvious dependence on the fortunes of the computer business. The process is complicated by the huge investment needed to build fabrication plants, and the large span of time required to do this makes it impossible for manufacturers to react effectively to sudden changes in demand.

For chip manufacturers, this is logistical nightmare. A new fabrication plant can take over a year to build and can cost over $1bn. Because of the long lead times involved, manufacturers will run plants to full capacity even when demand has slumped. This leads to a surplus of chips and plummeting prices.

The reverse situation is also true: when demand is high, plants are unable to increase their output capacity, leading to a shortage of RAM and inflated prices.

This instability in the RAM market is reflected throughout the computer industry. Towards the end of last year, Intel was in the business of procuring parts for its motherboard customers. But as RAM prices started to fall, Intel's knee-jerk reaction was to dump all its surplus stock on the open market. This put several major PC manufacturers in a panic and, terrified of being left with an excess of RAM, they all soon followed suit.

During the past six months this precarious process has worked to the benefit of the consumer but the market has still not settled. The street price for 8Mb of EDO RAM can vary from as little as £77 to as much as £140. The reasons for this are not initially clear. Those selling at the higher prices insist that their memory is of superior quality, that it is sourced from more prestigious manufacturers and that it has been more thoroughly tested.

"The main factor in differently-priced SIMMs is quality," said Nicola Ellis from Kingston Technology. "There's a lot of inferior quality memory on the market. Lots of it is stolen or made up from seconds."

Jamie Kelly, marketing manager at Memory Bank, the largest memory vendor in the UK, said: "We have decreased our prices a lot in the past six months; as much as the market can sustain. Anyone selling SIMMs at lower prices must be cutting corners on quality."

It is true that the reject rate of RAM chips in fabrication plants is appallingly high and that quality control may vary from one company to another. For the average PC user, it is a confusing situation — especially so, considering that most are not hardware experts.

The quality and warranty arguments are taken very seriously in the SIMM business and people are often prepared to pay extra for what they believe to be a higher-quality product.

Although quality is always a factor in any market, it doesn't fully explain the current disparity in RAM prices. The larger memory distributors try to keep their prices as low as possible by buying in bulk. So when Windows 95 failed to sell in the numbers expected, lots of dealers were left with a huge surplus of RAM stock. Large stocks take time to move, especially when you're trying to recoup costs during a RAM slump, so this is the more likely reason for the current price confusion.

If this is the case, then cheap SIMMs are not necessarily bad quality SIMMs and neither are they sold without warranty. In fact, many of the lower-priced SIMMs available now are sold with a five-year warranty and return policy — enough to extend beyond the life of most PC systems.

David Furby, a partner in Novotech, insisted that the correlation between low-priced SIMMs and quality is unfounded.

"The failure rate of all products we buy is incredibly low," he said. "The proof of the pudding is in the eating and they're not coming back as faulty once they've been fitted into machines."

Eleanor Turton-Hill

WYSIWOG and the Web

Adobe's PDF could present a serious challenge to the HTML format for Web publishing.

NEWSPRINT COINED the word WYSIWOG this month (*p21*) to describe what Adobe's Portable Document Format (PDF) does, which is to ensure that What You See on your screen is What Others Get on theirs when you send them a document or throw up a Web page.

HTML, the Web page description language, cannot guarantee WYSIWOG. It says "stick this headline here" and then leaves your viewer to decide the typestyle. Its formatting facilities are, in any case, limited.

Adobe's new Acrobat 3.0 bundle, which offers everything you are likely to want to do with PDF, should do well if the company is not too greedy on the price. Acrobat allows you, for instance, to output a magazine-standard Web page, with no compromises in design, straight from a desktop-publishing package.

My growing Acrobatic enthusiasm stems from a peek at the online *European*, which looks exactly like the printed edition. I am not suggesting that online and printed editions should look the same; only that there is every reason why they should look as good.

Moreover, the similarity is deceptive because PDF can do more or less anything HTML can do. You can click on a picture and get a re-run of last night's ITN footage on the subject. You can search the classifieds. You will be able to play other readers at chess. There's also an interesting experiment in marrying a TV and newspaper advertisement.

The *European* is not yet on the Web. It is available only by subscription (same rates as for the printed version) on an ISDN line, taking about 15 minutes for an edition to download.

The paper's technical development manager, Peter Green, believes the Web will offer fast enough connections for the service by next year. But the idea is that you hook up at cheap rates as you sleep, so download time is not that critical.

The *European*, and Murdoch's News International, have both looked at downloading by satellite and this is surely the way this kind of publishing will go (perhaps printing on your local laser). You can already download Teletext on a PC using a cheap add-on card.

For the moment, file size is an issue and is the one advantage that HTML has over the bulkier PDF. Sooner or later, we will have bandwidth enough to render the difference insignificant. Meanwhile, Adobe is making a big push on the Web and could make PDF a serious challenger to HTML.

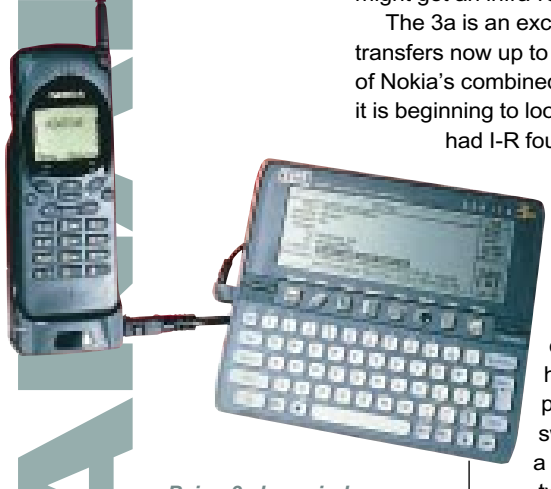
Clive Akass

ANALYSIS

In search of the definitive mobile

You can't argue with Psion's success in producing a world-beating organiser, but I fear for the company after its Comdex UK press conference, when the only news on the hardware front seemed to be that the Series 3a might get an infra-red (I-R) port next year.

The 3a is an excellent machine but with I-R transfers now up to 4Mbit/sec and the advent of Nokia's combined organiser and dataphone, it is beginning to look dated. H-P's LX palmtops had I-R four years ago.



Psion 3a has wireless email but is it in danger of becoming dated?

For my purposes, the Series 3a is too small though the keyboard is the best of its type. A definitive mobile for today's technology has yet to catch on. My guess is that it will have excellent comms, a plain LCD screen with switchable backlighting, and a keyboard big enough to type on.

Battery life, without power-hungry screens and drives, will be days or weeks rather than hours. The mobile will be designed as a second machine, an adjunct to a desktop or network, and will cost less than £400.

Intel's new USB port, due to appear this year, could transform mobile design, providing a cheap, robust, universal docking plug with 5v power supply and 12Mbit/sec data connection.

So we are looking at something like a bigger and better-wired Psion 3a. Not far either from a walking, talking, version of Larry Ellison's network PC but not in the price league of Tim Bajarin's current enthusiasm, the Libretto (see *p34*).

Notebook makers show little interest in producing anything so cheap and simple. The nearest they get are slimlines like the Omnibook or IBM's new Thinkpad 560. When I muttered something along these lines to IBM UK chief Mike Lunch last month, his immediate reaction was that I was talking "low end". I seem to remember that is what IBM said about the PC.

● *What's your idea of the definitive mobile? Send your ideas to us at* Newsprint.

Computations

Borehole bore

Oil companies are preparing for a crowning era in marine oil drilling. New carbon-fibre tethers for rigs will make it possible to drill for oil to depths of over 2Km, thereby emptying not only most of the future generations' oil as we are now doing, but all of it.

● **Source: Kvaerner. Dupont Inc.**

The Green-Gauge

Nokia Communicator 9000	
Energy draw:	2.3W
Weight:	397gm
Take-back:	Recyclable
Packaging:	Recyclable

Citizen PN 60 notebook printer	
Energy draw:	2.3W
Recycled paper:	Approved
Polymer coding:	Yes
Packaging:	Grune Punkt

Bomb culture

Talks are under way to establish a moratorium on nuclear bomb testing, now that it can be done by computer game. Perhaps Britain should foot the bill? According to unrelated reports in *New Scientist* magazine, Britain has five times more personnel than the USA working on H-bombs. Staff numbers at the core nuclear weapons programme at Los Alamos, USA, are reportedly down to 900 while those employed building H-bomb warheads at Aldermaston are put at 5,000, which, incidentally, is the number of people said to be employed in North Korea's entire civil nuclear power industry.

● **Sources: *New Scientist* Nos. 1929 & 2000. Song Ui ho, *The Korean*, March 1994 pages 252/267. Carnegie Intl Endowment for Peace. Vertic.**

BY ROWLAND MORGAN

Chinese checker

Taiwanese computer penetration is estimated at 67 units per 1,000 workers. With mainland China racing to catch up, the world's biggest population promises to be operating 33.5 million workplace computers as soon as they can be supplied. If built on current lines, the machines would consume some 12bn Watts of power, needing six major power stations of the Didcot-A type. That should be no problem, though, as Beijing has announced plans for 1,000 coal-fired power stations with which to enter its grave new world.

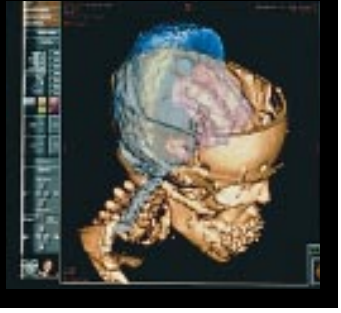
Energy-sipping laptops could be supplied in large numbers if China produced them at Taiwanese speed: over two million a year. About 120 million could be coming from the People's factories: a stack about 4,800km high. China catch-up offers endless gallows humour for our planet: when the Chinese catch up with South Korea's current air travel, for instance, they will have more than twice the US's polluting airliner take-offs; over 6,000 a day. If the Chinese adopt UK flying habits, the country will have 17 million airliner movements a year, averaging over 46,000 a day (or 32/sec). This is one reason that the polluting airlines say they intend to have £500m a working day being spent building world airports in the year 2000. The only snag will come when the world decides their kerosene should be taxed. Or when the skies turn brown.

● **Sources: *Euromonitor Int'l Mktg Data & Statistics 1994*. RM/BAA plc annual report. *The Hutchinson Guide to the World/Building* No.40 vol CCLX. Craig T. Chin on http://gurukul.ucc.american.edu/MOGIT/cc3461a/taiwan.html**

Is there intelligent life?

Your neighbour is 98.2 percent brainless. Yes, the brain's average percentage of human body weight is only 1.8. But even so, researchers believe a human brain makes more connections than all the phone callers in the US in the past decade, with estimated brain nerve cell connections amounting to one quadrillion. Now, let's see, in which synapse cabinet did I store my elastic bands?

● **Source: National Geographic vol 188 no.4**



● *Walk on the wild side: If you relish the wilder side of facts, I can heartily recommend you buy my new factbook,* Digitations*, published by Michael O'Mara at £4.99.*

Moscode

Just one percent of NATO's 1,200 staffers, each of them costing an average £550,000 a year, can speak fluent Russian.

● **Sources: Andrew Mackinlay MP, *Hansard* vol. 264 no.143, col 228. NATO (NATO HQ budget $1bn).**

Shifty control

A major survey indicates that over two million UK small businesses have yet to computerise. But even slower than trade is justice. Apparently, no High Courts in Wales and England use computers to keep their records, although a £15m computer system is being installed for immigration officers to screen non-EU visitors to the UK.

Medicine is not exactly dashing into the digital either: 21 percent of Britain's 19,508 medical receptionists still don't have practice records on computer. Worst of all, though, has to be education: 17 out of 18 UK primary school children have no classroom computer.

● **Sources: *Banner*. DTI. *Law Society Gazette*. ICL. *Computer Weekly*. DoH, *Hansard* Vol. 242 no. 94 col. 370 (1993 survey). BBC News & Current Affairs.**

STATELLITE

➡ For every job created in the industrialised world, 12 must be created in developing countries.

● Source: *The 1994 Information Please Environmental Almanac*, Houghton Mifflin USA.

➡ Nearly 46 million Japanese residents do without flush toilets.

● Source: OECD. *Nature* vol. 369, no. 6475.

Sounding Off

"Hidden horrors that lurk on the Internet" screamed the *Evening Standard*'s headline (25th April). According to the author, Richard Holliday, the horrors include instructions on cannabis cultivation, "loads of information on Satanism", a list of London's seedier tourist spots, cannibalism for beginners, secrets of "speed seduction", and DIY atom bombs.

MICHAEL HEWITT

The gist of the piece was that these things are guaranteed to corrupt impressionable young minds. The positive side (the fact that it could at least keep them quiet during the school holidays) wasn't even touched upon.

You know my views on the Internet by now: it is to intelligent information gathering what a Pot Noodle is to haute cuisine. But the *Standard*'s apocalyptic warnings of stoned, priapistic, Satan-worshipping, cannibalistic 12-year-olds rampaging around with their fingers on the nuclear trigger sounded intriguing. So I decided to log on and get thoroughly corrupted. Where possible, I sought out Holliday's recommended sites.

HempWeb is an All You Need To Know About Cannabis site. There are terrabytes of narcoleptic material on the history of cannabis: how to grow it ("High nitrogen fertiliser...is great for the vegetative phase"), ways to prepare it, how to smoke it, and so on. Unfortunately, the overall academic tone makes the stuff sound so "establishment" and its production so Percy Throwerish, that impressionable teenagers could be turned right off and on to something more hip instead; like Ribena.

On to Satan's Playground, which poses the question: what is a Satanist? "I am," says David R. Ondrejko who also goes under the *nom de voyage* of Von Draco, "...but I reserve the right to call myself a plate of fruit salad if I so desire." The self-indulgent, west coast USA tone renders Satanism about as alluring as membership of a bowls club. Actually, 80 percent of the material here is anti-Satanist, from rabid Christian Fundamentalists: "Ten ways to tell you've been possessed by a demon." If so, they provide Web addresses for ecclesiastical versions of Rentokil to deal with the problem. Youngsters will find out more about Satanism, in a more readable form, from buying a Dennis Wheatley novel, available from virtually any bookshop.

Squiffy's Guide to London has the amazing revelation that there are strip clubs in Soho — but would the average spotty teenager get past the door-man? If he doesn't, and is feeling understandably frustrated, rates for prostitutes are also quoted. But I can't see them being of much use to an impecunious youth: the cost of even an economy "quickie" is far in excess of a whole month's pocket money.

But maybe the teenager doesn't need to avail himself of the services of a professional lady. According to Ross Jeffries' Seduction Site, "You could get the hottest woman lusting and eager for you within 20 minutes of meeting you, without even having to bother with a date." The technique is called "Speed Seduction". I took the trouble to download a .WAV file of one of the surefire chat-up lines so you can see how effective it might be. Here's a verbatim transcription (the emphases are Ross's own): "...so think about this: how surprised would you be to actually find yourself *really* enjoying spending time with me? Like maybe to the point where you can picture us, over coffee, laughing and having the *best* time. And you're starting to *really* get excited over it."

It appears to be a subtle variation on the "Get your coat darlin', you've pulled" line. Whether a 12-year-old would be able to deliver it with the necessary gravitas is, however, open to some doubt; whether the object of his desire would be able to stop giggling long enough to supply a suitable riposte, even more so.

"Butchering the Human Carcass for Human Consumption", comes courtesy of Bob Arson. "This is a step-by-step guide on how to break down the human body from the full figure into serviceable, choice cuts of meat," he says. And so it is. If your plane has just come down in the Andes, I suppose it could be of some practical value, but to the Big Mac generation, used to getting their sustenance in seconds, cooking the nextdoor neighbour is going to sound much too time-consuming a process. Now, if Bob had come up with a recipe for Instant Man, i.e. "just add boiling water and leave to stand for three minutes", then he might have been on to something.

Finally, to Outlaw Labs' file on how to make your own atom bomb. It looks detailed; but once Junior has sourced his 110lbs of plutonium, together with the beryllium and polonium needed for the neutron source, he's going to be really upset when he gets to the bit about assembling the detonating head. Here, it says: "The amount of pressure needed to bring about... [a chain reaction]... is unknown and possibly classified by the US Government for reasons of national security." So after all that effort, and all that mess on the bedroom floor, all he's got is a dud.

It's all harmless garbage. If Holliday wants to mount a crusade, I'd suggest he turns his attention to those dubious 0891 chat lines, such as the "Instant Connections to up to 45 WOMEN LIVE ON LINE", on page 42 of the *Evening Standard*.

Homefront

One thing computer users are never stuck for is a suitable acronym. I could easily fill this page with some of my favourites and doubtless one day will, but for now I want to concentrate on just two. The first is FAQ — a frequently-asked question. It's an expression used by the on-line cognoscenti to make newcomers feel small and stupid.

"How do I stop my printer spitting out alternate blank pages with WordSoup 8.0 for Windows?" an innocent asks at the appropriate CIX conference.

"Ha!" says the first on-line cognoscente (OLC) "That's a FAQ."

"Yes" chimes in a second. "We had that one a few weeks ago. Definitely a FAQ."

"And a month or two before that, ISTR" adds a third OLC, "starting with message 2,784" (knowing full well that the newcomer won't have message 2,784 or any idea of how to find it).

CIX is a friendly and helpful place, however, and after a few rounds of this preludial banter, someone will have the decency to actually answer the question.

"You have to manually edit WordSoup.INI, adding the lines 'stickextradamnpagein=FALSE', set the dipswitches on the printer to 1010011010, then hold down the shift key every time you load WordSoup."

Less kindly souls might tell the enquirer to RTFM. This stands for "Read The FAQing Manual" — at least, that's what it sounds like — and it's this delightful acronym that is the object of my concern, as it has become an endangered species. It could soon be relegated from the living language to one of those historical curiosities such as ITMA or FAB which are understood only by BOFs.

Let me elucidate. With MSDOS 4 came manuals totalling around 1,000 pages. Windows 3.0 added another 640. The combined upgrade to DOS 5 and Windows 3.1 cut this literary banquet slightly, as the GW-Basic course was removed, but the total was still over 1,200. With Windows 95 and whatever the current version of MSDOS is officially called, came one 95-page book, which is hardly a snack.

TIM NOTT

Microsoft Office has also seen a drastic cut: 2,000-plus pages of serious reference has shrunk to just one "Getting Results" book. And to be fair, it's not just Microsoft — Lotus Smartsuite's documentation has declined from five solid inches of bookshelf real-estate to a pair of flimsy booklets. The manual, as we know and love it, is on the way out and with many new shrink-wrapped applications the most substantial piece of documentation is the licence agreement.

Were this because software was getting simpler, then it would be a time to rejoice. Although this may be true for many consumer titles, which run direct from the CD without human intervention, it certainly isn't the case for most serious business software. Every release brings more: there are more features, more options, more buttons, more menus — but less paper to explain it all.

There are some honourable exceptions: CorelDraw still comes with a pair of door-step manuals and PageMaker has a stout slip-case full of documents; AutoCad comes with over 2,800 fun-packed pages but a price tag of over £3,000 makes it an expensive read.

So where have all the manuals gone? Usually, most of them end up either on the hard disk or on the installation CD-ROM, or a bit of each. And this is a pain in several slightly different but equally sensitive areas of the bottom.

First, the documentation is stored on your hard disk rather than the publisher's paper. Second, if you need to consult the bits that reside on the CD, then you need to have this in the drive rather than your favourite reference work or music disk.

Third is the question of portability. I used to like reading computer manuals in the bath. Perhaps I should qualify that statement: I'd rather read almost anything else, but if TFM had to be R, then the bath was a good place to do it. For a start I could legitimately claim to be working and then, if my brain got full, I could put the book down and submerge it (brain, not book) for a while. So, until someone invents a dinky, floating, waterproof PC the bath is no longer an option.

Back in the old days, people bought third-party manuals such as "Mastering WordSoup" largely because they'd nicked the software. But that was in the days when WordSoup fitted onto two floppy disks and the act of piracy could be carried out in a few minutes. Now, it's probably more cost-effective to buy a legitimate copy, rather than attempt a clandestine transfer involving fifty floppies. But having done the decent thing, it's rather irksome to have to fork out another £30 or so to get some printed explanation of how it all works.

So I'm starting a campaign for real application paperware. Just as soon as I can think of a suitable acronym.

Straight talking

I am delaying my planned column for this month to make room for an urgent warning. If you are thinking of subscribing to BT's new Internet service, insist on a short-term trial before subscribing. Once again, BT has succeeded in snatching defeat from the jaws of victory.

BARRY FOX

I say this after having first tried BT Internet (BTI) on a Pentium and then giving up and failing on a 486. The user software is such a pig's ear that BT had already cobbled together a revision (v1.1) soon after the service launch. But you must be an existing user, and successfully online, to download it!

I've spent ten times longer on BTI than I would normally spend on any software trial. I did this because CompuServe and AOL are too smug and need some serious competition. I smelled a rat at the pre-launch press conference when BT's director of multimedia services, Rupert Gavin, and his managers promised "ease of use".

We were given various items including a piece of cardboard the size of a CD-ROM and a fresh banana with a stick-on label. We saw an edited video of a BT engineer installing the software but there was no software for us to take away and try. "We are trialling it now," admitted Rupert Gavin. "We are making final revisions."

In April, after the service had been safely launched on an unsuspecting public, BT provided review software. During installation, my Pentium with Windows 95 threw up a stream of error messages. BT's Helpline advised a string of fixes which would be way over the head of the novice user at whom BT is targeting its product.

Some staff were blindly reading from memos, obviously with no understanding of what they were advising. Others gave up and promised that someone else would phone back. A few admitted that the help line was being swamped with distress calls.

Because BT Internet works on the "all you can eat" principle, giving subscribers fast, unlimited access for the flat access fee of £15 a month, BT wants to stop several people sharing one password. So the master startup code works only for the first PC on which it is used. BT justifies this because the service is aimed at consumers who are new to computing and have only one PC.

So tough luck on those who hope to use BTI on both a desktop and a portable. If, like me, you end up in such a mess with the software that the only way out is to re-install, you must get a re-registration code which only works for one more try. When the software installs, it renames existing files "to avoid conflict" (even "escape" can't stop it). Renaming files is always risky. I answered "Yes" to the question "New User?" when I should have answered "No": up came questions about Pop-3, Popserver, SMTP and Mailhost, culminating in "Error 513. Try again later"; later was just as bad.

"Checksum does not validate" was my punishment for failing to notice a "Re-load?" option for my re-reg code. When I finally got BTI working thanks to the file renaming, a BT Mail Spooler kept popping up causing error messages and preventing me from shutting down Windows 95. Worse, BTI hijacked CompuServe so that it dialled BTI's access number and, not surprisingly, failed to connect.

BT's bizarre advice is that the computer must be "reset" if the user wants to access another Internet-capable program like CompuServe after using BT Internet. This advice is buried in a Readme file which comes up on-screen towards the end of installation but without the option to print what will be complete gibberish to BT's targeted consumer base.

My first attempt at loading BTI on a spare 486 failed: the system froze and crashed. On the second try BTI installed, but when I tried to Register online (with my latest re-reg code) it crashed out of Windows to DOS giving the error message "No free file handles. Cannot load Command. System halted".

The Helpline blindly read from a memo advising that "If system crashes continuously..." the subscriber should be sent a disc with a new version of Spooler.exe and Launcher.exe. But until someone has registered they cannot launch or spool, or do anything except get very angry.

Edit Config.sys to increase the Files= line from 30 progressively to 80, advised the Helpline. The PC still crashed on any attempt to register online. But as a bonus I now got an error message warning that my "path statement exceeded the maximum" and advice from the Helpline to alter my System.ini file by changing the order of the Vcom and Serial device lines. Then there was talk of adding an EMM-exclude command, and I was told how to "disable" the default compression setting because BT's servers cannot cope with compression — remember, this is a service for novices!

And still no joy. Maybe I'll try a third PC. What I want now is an answer to the question I put to Rupert Gavin: "Did you ever personally try installing this half-baked system on your own PC, without an engineer giving you personal assistance and working only from the screen and helpline prompts like a paying customer?" Rupert Gavin claims that he registered successfully, without technical assistance. He says 93 percent of BT's customers have, too.

Business matters

For a number of years I was involved with a major UK company's executive information systems. These are probably the hardest computer systems to get right. The theory is simple: the people who run the company need fast access to any information that will help them improve the business. This is a complex mixture: from historical performance figures to stock market data, to competitor intelligence, to news. It would seem that computers, particularly PCs, would make the ideal vehicle for serving up this information.

If only it were that easy. Most executives prefer to dictate a letter to a secretary or ask a question of a personal assistant, than battle with a computer. Better user interfaces help but the technology remains a substantial barrier. As executives haven't got the time to spend half a day learning to use software, the executive information system (EIS) has to redefine the word "intuitive" (or perhaps I should say, restore its original meaning). Most importantly, unlike the majority of the workforce, the executive has a choice: no-one is going to tell them off for not using the company system; they have to want to use it.

So far, the EIS has moved through three distinct generations. Early versions used mainframes. To keep things simple they consisted of a series of basic menus, leaving limited scope for the user to explore. The next breakthrough came with the availability of off-the-shelf packages. These were often PC-based, providing the developer with tools to package highlights of the company's databases in a (relatively) easy-to-use structure. By this stage there was more flexibility in what could be achieved but the in-house developer was often frustrated by the boundaries placed on them by the environment.

As is often the case, the next generation was a throwback. The advent of visual programming languages like Visual Basic made it worth writing bespoke EIS applications once more. What was lost in immediate speed of development was more than compensated for by flexibility and the ability to build-in a corporate look and feel.

BRIAN CLEGG

That takes us to the present day. All three generations still exist in different organisations but I've a feeling that it's time to launch EIS "The Next Generation". The catalyst for this change is the use of intranets, the clumsily-named private implementations of the World Wide Web.

An intranet uses Web technology but is accessible only from within a company, based on its local area networks. This has been seen for some time now as a great way to publish documents — in fact, some consider it a serious threat to the impressive but very resource-hungry groupware giant, Lotus Notes. If Web technology had been frozen in time last summer, that's probably all an intranet would ever have done, but a combination of Sun's remarkable initiative in coming up with Java, and Microsoft's equally remarkable U-turn on the Internet, has not so much moved the goal posts as shot them into space.

Java applets and the Microsoft equivalent, ActiveX components, make it possible to have Web pages which are applications in their own right. A graph in a Web document need no longer be a static snapshot: it can now be updated on the fly, from a database. Interaction with Web pages can be much more powerful. Suddenly, an intranet has become an ideal development environment for an EIS.

It's a beguiling picture. An EIS needs the ability to be tailored: executives are used to the world being tweaked to their requirements and this is already possible on the Web, as pages like the personal *Times* newspaper and MSN's home page demonstrate. If you haven't seen these or other examples, check out my *Business Matters* links via my home page, http://members.aol.com/NotAHome/.

An EIS needs to be easy to navigate: the Web is built around this premise. An EIS needs to be easy to update: the popularity of the Web has generated a host of tools to create Web pages and update Web sites. Probably, above all (and most difficult with earlier implementations) an EIS needs to be flexible. It's a bit like preparing for Prime Minister's question time — you never know where the supplementary questions may lead. With the Web, the world's resources are available to follow up on an issue. Of course, there's lots of junk out there but there's plenty of quality information, too.

Conventional EIS has always been an expensive game. It's a small market and the buyer pays the price of exclusivity. Web technology, on the other hand, is the cheapest around with parsimonious companies like Microsoft falling over themselves to give away software. It all adds up to a significant inducement to boldly go into the next generation with a cheap and effective executive information system.

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pcw@vnu.co.uk
or **CompuServe 71333,2330**
or fax **0171 316 9313**

Letters

Price disparity

Keith Miller (*Letters*, June) seems to think that Gateway pays far less for Microsoft Office than UK manufacturers simply because it employs good negotiators and buys in very large volumes. Sorry, Keith, but this simplistic view is just not the whole story.

The concern is that there's no price parity between the US and the UK, and that American companies selling into the UK from bases in Eire (i.e. Gateway) therefore have a price advantage.

Microsoft, of course, denies that there is any disparity in pricing, yet a quick comparison of prices of systems sold in the US, with and without Office, shows that the difference is much less than it would be if prices were in line with what UK system builders have to pay; even for systems from relatively small suppliers.

This is not just sour grapes. The Office of Fair Trading has taken up the complaint and referred it to the Competition Directorate of the European Commission. Some companies are also considering High Court action against Microsoft should the EC find against it.

Phil Stanton
phil@equinox.co.uk

Super-service

I have been following the correspondence about standards of service and delivery delays (*Letters*, May and June).

Some of my experiences with well-known companies, such as Computers by Post, Technomatic, Software Warehouse and Gateway 2000, can only be described as bizarre.

However, the main purpose of my letter is to propose accolades to companies who have never let me down: Novatech and Action Computer Supplies. Neither has ever failed to have goods delivered to me the following day. Novatech has just been honest enough not to accept an order for an item which was out of stock and the delivery date uncertain. Action's best was to deliver a Toshiba portable, ordered at 4.30pm, to my door at 11.15 the next morning.

I also remember ordering from a firm called Microtronics (which advertised on your Micromart pages). Halfway through taking my order late one afternoon, the gentleman at the other end of the phone dashed out into the yard to stop the van leaving so that my order could be on it. The goods arrived at 8.15am the next day.

I wholeheartedly agree with Joseph Farrugia (*Letters*, June): if you don't get the service you expect, don't repeat the business.

Neil Howie
nhowie@msn.com

Browse beater

It vexes me greatly that you gave the impression that Mosaic was the first WWW browser (*News Analysis, PCW* May). It wasn't.

If you want to run the real granddaddy of them all you 'll need a NeXT computer: Tim Berners Lee's original WorldWideWeb.app was developed on NeXTstep (as it was spelled then) way back in 1990. Playing with that gives a kick that no Windows (X or Microsoft) application could ever do. Talk to Chris Bidmead about it.

Malcolm Crawford
M.Crawford@dcs.shef.ac.uk

Clive Akass replies: *Thanks for your interest. If you read my piece carefully you will see I did not say Mosaic was the first Web browser. I referred to the* earliest *Mosaic. NSCA, incidentally, has just released a new version.*

I interviewed Tim Berners Lee two years ago and wrote of his early browsers. His father told me this was the first major article on him, in Britain. I did not see his NeXT browser, but I understood it to be text-based. One of my reasons for doing the piece was that it seemed TBL was not getting the credit he is due. And, of course, he is English.

Mosaic was not even the first graphical browser, or at least there was one out at

Short and sharp

What the Dickens?

I'm sure that I cannot be the only one to have spotted the liberty you have taken with Dickens ("Balancing Act", *PCW* May).

Mr Micawber did not say that happiness was dependent on an annual expenditure of £19.96, as I'm sure you all know! Did you *really* think your readers wouldn't understand "nineteen shillings and sixpence"? Or were you setting a trap for old fogies like me who aren't afraid to admit they remember what a half crown was?

Adrian M Attwood
101727,3500@
compuserve.com

Will the *real* Mr Capaldi please stand up?

I can't believe it! I actually got a letter published in the great *PCW* (*Letters,* May) — thanks.

Aagh! I can't believe it! You've put somebody else's name and address at the end of the letter. Who *is* Colin Barnes, 100273,504? Thanks a lot! In frustration,

Mark Capaldi
100610,3057@
compuserve.com

Not *PCW*'s forte

There it is again! On pagé 339 of thé Juné issué (whoops! Now I've caught it!), that mysterious word "forté".

I had not seen forté in *PCW* for a while and I was beginning to think that it might have disappeared from your spell-checker; but no.

The word you want is forte (*sic*). There is no accent in any of its manifestations, from Latin (from fortem, the acc. of fortis) to Italian (forte), and finally to English (forte; with us since the 17th century, via the French, fort); in any case, the stress is on the "o", not the "e".

Continental accents are an unavoidable nuisance in many cases, without inventing more. So, may I plead with you forte, forte, to drop "forté"?

Mr P Ghiringhelli
Bradford

much the same time, called Cello; it never took off to the same degree.

My point that the early Mosaic opened up the Web still stands, I think.

Can't sign up to MSN

Having just read the May issue of your excellent mag (flattery seems to work wonders!), and having been mightily impressed by the articles on MSN (particularly as they offer 100 percent local call access across the UK), I attempted to sign up "on-line".

I am currently a CompuServe member and very satisfied with the service. However, CompuServe offers only 85 percent local call access — and guess what? I'm in the other 15 percent.

All went well until I reached the "methods of payment" bit. The options were MasterCard or Visa. As I have neither of these cards I rang the Help desk and offered to pay by Switch. "Sorry, we are unable to accept this method of payment".

Okay; how about if I send you a cheque?. "Sorry that won't do either", came the reply. Well, what about a bankers draft? Cash by carrier pigeon? Or even personally delivering filthy lucre into your sweaty mitts? — getting a bit desperate by now. "Nope."

Forgive me if I am wrong, but all your articles seemed to suggest that MSN was intending to make itself a serious contender in the service providers' market. I am a great admirer of Microsoft products, but as far as service providers go, they don't even come up to CompuServe's boots!

Paul Drawmer
CompuServe 73064,1461

DMF doesn't prevent piracy

What *is* Tim Frost on about (*Innovations*, June)? There's nothing to stop anyone creating or copying DMF format disks: there have been shareware programs around for some time, and the current version of the Norton File Manager will copy and format DMF disks with 1 or 2K sectors.

I don't think the people at Microsoft would be dumb enough to think that this type of format would deter "casual piracy" for very long.

Les Kneeling
les@lesk.demon.co.uk

Tim Frost replies: *You are dead right that there is nothing to stop those who know about these things from copying DMF disks. What I tried to highlight in the article, by not concentrating too much on the piracy issue, was that it was "casual" piracy (i.e. home and individual office users copying disks for friends) that is disappearing.*

Not all of that is down to DMF. Software is cheaper now and the culture of software piracy is lessening while the culture of software ownership is expanding. But DMF is part of that. Copying Microsoft's disks needs, firstly, an understanding of what DMF is about. Secondly, a copy of Norton or a shareware equivalent. Thirdly, an understanding of how to use it to copy these disks.

You and I and many computer-literates may have all of this, but I'd suggest that as PCs become just another "brown-goods" product like a VCR, that you buy and use preloaded with software, fewer and fewer users qualify on all three counts.

I did say that the anti-piracy element of DMF was a side issue. And indeed it is. Microsoft didn't do it to stop piracy, but to save disk and duplication costs. It appears, in retrospect, to a degree that surprised Microsoft (since they know it can be copied, too) to have curtailed much of this sort of "casual" copying.

Did I hear you right?

I read Mark Whitehorn's piece on noise cancelling (*Horizons,* May) and was disturbed by two basic errors.

Humans, with good hearing, can hear sounds covering the frequency range 20Hz to 20kHz (twenty thousand), *not* 20MHz as stated in the piece. The error is compounded by the calculations further along in the article. Additionally, what does "they can reduce sound levels by 50 to 95 per cent" mean?

Who did you get to check it for accuracy? Errors like this make me wonder what other blunders you get away with on subjects about which I am not a specialist.

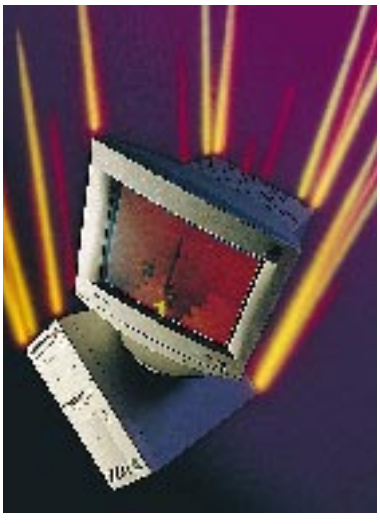
Terry Metcalfe
acoustic consultant
Ipswich

Mark Whitehorn replies: *Ouch! Sorry, I admit it; it was a mistake. In a previous life (before I was seduced by computers) I did know that the upper limit of hearing was about 20kHz. Time, and a long association with computers, obviously transposed the units to MHz in my brain. Once the transposition had been effected, I rattled the incorrect numbers into the calculations. However, my foolish error doesn't affect the explanation I gave about how active noise suppression works, nor does it stop it functioning.*

As for the second query, this means that the amplitude of the wave can be reduced by between 50 and 95 percent. The actual figure will depend on various factors such as the frequency and the initial amplitude of the wave.

In future, I promise to keep my errors to something less than three orders of magnitude!

Noisy fans need locking up



I found your recent article (*PCW*, May) about 100MHz "entry level" Pentiums very interesting. I thought that the Doom2 test and the Corel test were very revealing.

However, I find that one of the most irritating things about computers is the fan noise. Many people, like myself, buy their PCs from mail order firms, so it is not possible to judge the noise level before purchase.

My Viglen Genie 486 DX66 is a very noisy machine. Indeed, some other makes I have heard are so loud that they are difficult to work next to. A friend of mine had to place his Amstrad PC in a cupboard (suitably ventilated, I would add) because its fan was unbearably noisy.

In future tests, could you provide some guide on the noise levels of various makes? And does the noise vary among different machines of the same make? Could you also provide some hints on how to reduce this intrusion (bearing in mind the ventilation problem)? Thank you for a great magazine

Jeremy J Mann
101530,2700

Under-16s want discounts, too

I read with interest the item in Newsprint *(Short Stories,* June) that Microsoft gives student discounts on its software products. I fully agree with Lord Avebury's view that under-16's should also get the discounts, but I think that other software companies should give discounts, too.

For instance, the Adobe publishing suite costs over £800. Fair enough for large publishing companies and graphic design workshops, but only a dream for people like myself (a 16-year-old studying for GCSE's). If the collection of Illustrator, Photoshop and PageMaker were available to students for around £100, they would sell more copies. An additional benefit would come from having large numbers of young people, with a good knowledge of their products, who would probably be more likely to use them in the future.

I can't see what large companies like Adobe have to lose by letting students have discount prices on software.

Sam Breuning
breuning@thenet.co.uk

Who owns Acorn?

My pleasure at reading a reasonably objective article ("Cambridge revisited") in *PCW* (June) about the Acorn company was rather diminished by the reference to it being "a wholly-owned subsidiary of Olivetti". In fact, it is now roughly 50 percent owned by that company and its shares (quoted on the UK stockmarket) have been rising quite consistently in 1996, partially due ("sources suggest") to institutional investors wanting to invest in a major player in the NC market.

Stuart A Bell
sabell@argonet.co.uk

OS confusion causes computer illiteracy

Oops! Dr Styring (*Letters*, May) seems to have lost the plot. He derides the educational value of "point and click" interfaces (and the Mac OS in particular) yet states that he has "never looked back" since moving to Windows 95 — a system renowned for its "command-line" interface… NOT!

The illogical defence of one operating system over another, and the resultant confusion, is a prime reason for the current level of computer illiteracy among adults. Computers are mere tools, and the educational "merit" of the Mac OS (or any other system) is totally irrelevant.

Furthermore, knowledge of fundamental principles is not always essential to actually doing things. Why doesn't Dr Styring say what he really means: if it isn't difficult to learn, it isn't worth it?

Many computer users work quite happily with only a rudimentary knowledge of the operating procedures of their machines. The introduction of the Mac GUI and Windows made computing accessible to millions. His comparison of the Mac OS with Speak and Spell and My First Computer is simply re-hashing the mid-eighties "Macs and Toys" myth — one which died, incidentally, with the commercial use of DTP and computer graphics. Why don't we all become Luddites? "Down with computers and calculators! Destroy anything that makes the world easier!" Or, we could stop arguing about which is the better OS and get on with doing things.

Dr Styring (and others within the education system) may be shocked to discover that their real task lies not in discussing teaching methodology, but in a transmission of skills and enthusiasm. Far too many teachers regard the means as being more important than the end product: a fact confirmed by the poor rate of basic literacy among many school leavers.

As a training advisor, I work with the long-term unemployed. Their problems often stem from continually-changing, fashionable teaching methods and the resultant poor teaching standards. They are simply unable to satisfy modern employment criteria; in particular, the use of new technology.

No-one can teach. Good "teachers" merely aid learning by stimulating curiosity and passing on their enthusiasm for a subject. Bad teachers recite dogma and old news.

System preferences are incidental to the task of making people want to use computers and enjoy them. Schools should use Macs, Amigas, Windows PCs, or even fluorescent pink, steam-driven fridges, running a variant of Unix written by Anthea Turner, just so long as their teaching staff pass on a desire to explore computing! Hardware/software differences are no substitute for insight.

P.S. If Dr Styring knows how to get Photoshop running on "My First Computer", could he pass on the information? It would save a fortune on equipment!

Clive Routley
Birmingham

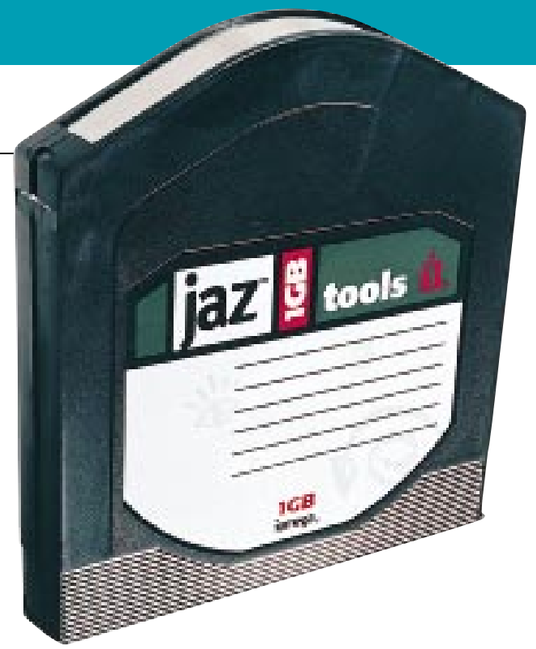
The cost of access

In your June issue you published a price comparison of the cost of ISDN Net access, in which you quoted UK Online's ISDN Net connection price at £314.99; the same as its standard modem dial-up connection. This is true, but doesn't tell the whole story.

The £314.99 figure is for our unlimited time family access scheme. This actually buys you up to four separate Internet connections. Yes, you could have four Internet ISDN connections. As the price is inclusive of VAT, the real cost per ISDN connection can be as low as £33.74. Not many people know this.

Steve Patient
senior editor, UK Online.
Steve Patient at home
spatient@ukonline.co.uk

Iomega Jaz cartridge



This is the cartridge for Iomega's long-awaited Jaz drive, reviewed in *First Impressions* (page 58). Barely bigger than two floppy disks stuck together, these removable cartridges store 1Gb and are expected to cost £89 (plus VAT) each. Using conventional hard disk technology they're quick, too, virtually matching the performance of a typical 1Gb drive. The Jaz drive is available in several flavours: internal SCSI-2 for £399 (excl VAT), or external SCSI-2 at £499 (excl VAT); both are RRPs. Internal IDE models will follow. Everybody will want one, but watch out for SyQuest's competing SyJet drive, due soon.

Contact Iomega 0181 899 1734

Casio OH-20

Casio's new OH-20 is the world's lightest and most compact overhead projector. Weighing just 1.1kg, it measures 134 x 184 x 293mm when open but folds down to a mere 58mm thick: this is a truly portable presentation device. You'll need mini acetates to use as slides: the OH-20 comes with ten of these, pre-punched for use in the binder which is also supplied along with a spare halogen bulb and a soft case. Magnification ranges from 6.4 to 15 times, while projection distance is 1.2 to 2.6m.

Price £599 (inc VAT)

Contact Casio 0181 450 9131

Sony SRS-PC300D active speakers

Decent multimedia speakers are all the rage, so it's not surprising to see a respectable set from Sony. Its SRS-9C300D active system consists of the common three-unit design: two, small, magnetically shielded "satellite" speakers which sit (or can be attached to) either side of the monitor, and a single, large sub-woofer which handles the less directional deep bass sounds. The beauty of such a system is that the sub-woofer unit, complete with controls and amplification, may be positioned out of sight under your desk but performing happily. Sony's system pumps out a total of 25W which will enhance your sonic experience, be it Duke-Nuk'em or Encarta.

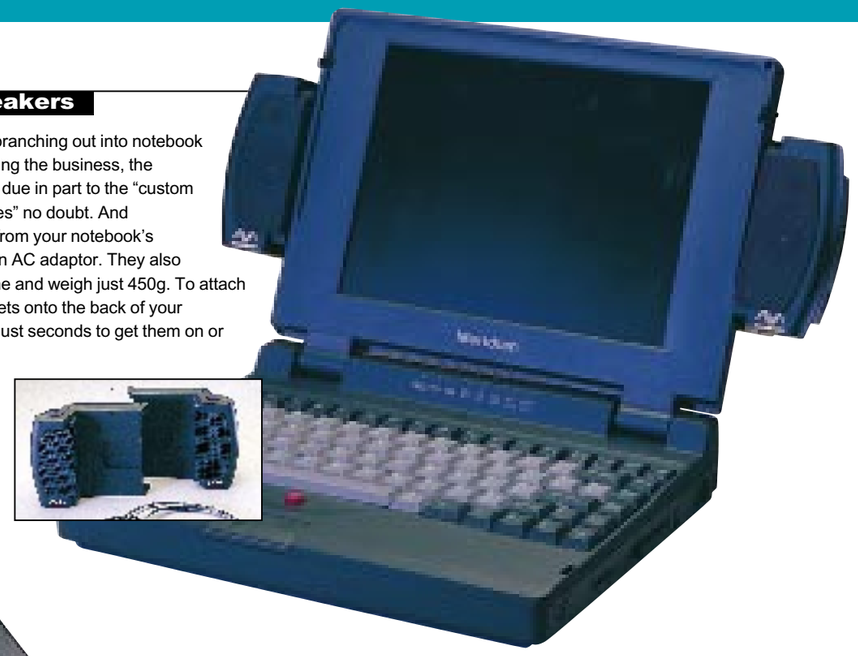
Price RRP £139 (excl VAT)

Contact Sony 0181 760 0500

Gadgets

PCW Gadget Photography by Bruce Mackie

LapTalk notebook speakers



New Media, known for its PC cards, is branching out into notebook speakers with LapTalk. Apart from looking the business, the speakers also sound surprisingly good, due in part to the "custom designed, tuned port acoustic enclosures" no doubt. And because they take their power straight from your notebook's PS/2 port they don't need batteries or an AC adaptor. They also feature a high-quality built-in microphone and weigh just 450g. To attach the speakers, you stick mounting brackets onto the back of your notebook's screen. Thereafter, it takes just seconds to get them on or off, and they lock together rather neatly for easy transportation. Other features include jacks for sub-woofer out and line-in for a CD player.

Price £135 (excl VAT)

Contact Portable Add-Ons 01483 241404

Canon MP10

Hot on the heels of Toshiba's TF-461, reviewed in *First Impressions* (page 74), is another multifunction device from Canon. The MP10 boasts the usual array of all-in-one features including printing, faxing either standalone or from the PC, copying and greyscale scanning. The MP10 is based around Canon's BubbleJet technology and prints at 360dpi. There's a 20-sheet automatic document feeder, a full hour of backup memory, 47-page fax transmission/reception memory and the capacity to receive 100 sheets of pape. Remarkable, and a full review next month.

Price £799 (excl VAT)

Contact Canon 0181 773 6000

IBM Thinkpad 560

The days of lugging around thick, heavy notebooks could be ending — so long as you've got enough money, that is. Several major notebook manufacturers are excitedly touting their new, svelte goods for release over the next few months. Here's IBM's Thinkpad 560: a phenomenally slim model, lightweight at 4.1lbs but by no means light on features. There's a choice of 12.1in active matrix or 11.3in dual-scan SVGA screens, and 100MHz or 120MHz processors. A 133MHz will be available later.

Price Not available at press time

First Impressions

Things moving a bit slowly? Jaz them up with Iomega's new drive. Intuit's Quicken is spruced up, and Turbochip and Make-it help you whizz along the upgrade path. Hewlett-Packard's latest printers boast PCL, Poser for Windows lets you manipulate the human form, and Cubase 3.0 tunes in.

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Contents

VNU European Labs

VNU Labs tests cover every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The tests are continually developed and enhanced to reflect hardware and software developments.

Our tests closely simulate real-world use. For example, our suite of PC benchtests uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom 2 frame rate test which is a good indication of games performance.

Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. The tests, which are mainly Windows-based, are used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

● To make them easy to read at a glance, all graphs in *PCW* are drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.

HARDWARE

Iomega Jaz Drive

A fast, economical drive with plenty of garage space.

Storage has replaced processing power as the major bottleneck in PCs. There is little point in being able to process huge multimedia files if you have nowhere affordable to put them. By coincidence or not, the cost of storage has suddenly begun to drop as fast as processor prices.

Iomega started the trend last year with its Zip drive, which took removable 100Mb cartridges and offered the first cheap high-capacity alternative to the ageing 1.44Mb floppy. Now the company has its competitors on the run again with the Jaz drive, which takes 1Gb cartridges.

The Jaz is essentially little different from a hard disk, except that the twin platters sit in a cartridge protected by a dust-proof shutter which springs open on insertion to provide access to well-tried Winchester read-write heads.

The drive comes with a choice of IDE or SCSI-2 interfaces and a suite of Mac or Windows file-management tools on a bundled pre-formatted cartridge worth £89 (plus VAT).

We got to test the £399 SCSI 2 internal model which fits into a standard 3.5in bay. The £499 external version, with its 8.5in x 5.5in x 1.5in case, is styled much like Iomega's other low-cost removables though they are easily identified by colour: blue for the Zip, dark red for the (tape-cartridge) Ditto, green for the Jaz.

We tried the Jaz on a Pentium 150MHz with an Adaptec 2940 PCI SCSI-2 card under Windows 95. The Bench utility in Adaptec's EZ-SCSI 4 software measured the Jaz's sequential transfer rate as being close to that of the 1Gb Seagate ST31230N SCSI-2 hard disk, and between a quarter and a third slower in random access times: the Seagate is fast, so the Jaz measured up very well indeed.

The software sets itself up in seconds with a flurry of animated logos. The tools are based on the Zip toolkit with its emphasis on easy one-step backup, and help you keep track of files on different disks.

Right-clicking the Jaz icon in Windows 95's My Computer offers several additional options. These directly activate the numerous utilities, such as formatting, backing up or making a complete copy of an entire drive — space permitting.

Another utility allows the drive to "guest" on another PC, so that you can take it with you if you wish to transfer files to a Jaz-less machine. A similar feature helped the Zip to make inroads into print and imaging shops, loosening the hold of rival Syquest drives.

The drive is well fast enough for a video data stream and a single cartridge can hold several hundred digital photos. You can boot from the Jaz, so it also offers an easy way to run multiple operating systems from different cartridges.

A big question is whether you will be able to get hold of a Jaz. Iomega could not keep up with the demand for the Zip and it has yet to prove it has solved its production problems. And then there is Syquest. It rushed out the EZ-135 (reportedly losing $40 on each one sold) to counter the Zip and has been forced to pre-announce a Jaz rival called the SyJet which, on the face of it, looks to be a better bet.

Syquest claims the SyJet will be available this summer at £349, and will take 650Mb cartridges costing £40, or 1.3Gb cartridges at £60, with a performance roughly matching that of the Jaz. Syquest is also bringing out a range of drives which will be backward compatible with the EZ-135 (see *Newsprint*).

But both Iomega and Syquest have been guilty recently of what might most kindly be called strategic hyperbole. When the stakes are as high as they are fighting for, you can only believe what you see on the shop shelves.

Clive Akass

PCW *Verdict*

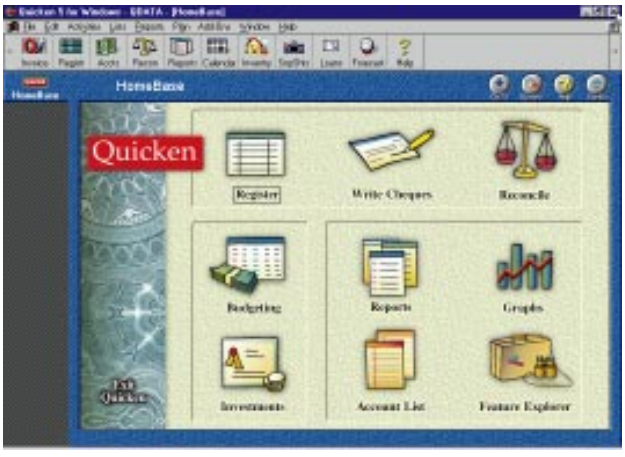
Price £399 (plus VAT) internal; £499 (plus VAT) external
Contact Iomega 0181 899 1734

Good Points Fast. Cheap. Large capacity.
Bad Points First in a rapidly developing, fiercely competitive market.
Conclusion Everyone will want one. Watch this space for rivals.

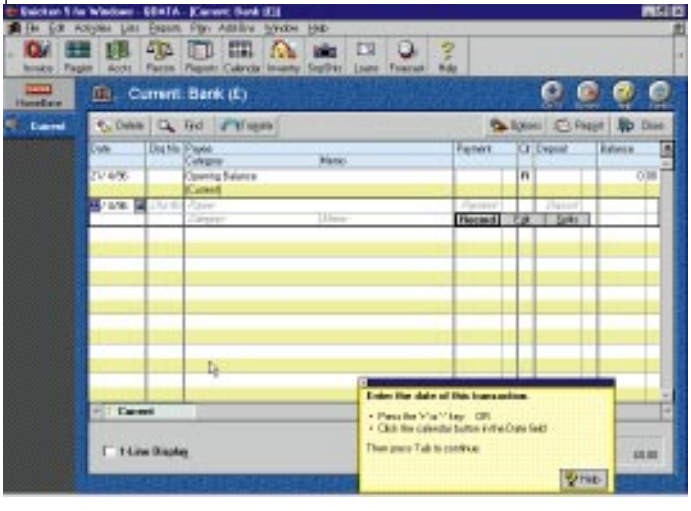
SOFTWARE

Intuit Quicken 5

A wash and brush-up for a respected personal finance manager.



Right *The new HomeBase screen*
Below *Opening a new current account in Quicken*



When you begin with a well thought out and well executed product, it is inevitable that upgrades will be largely cosmetic enhancements — just a tweak here and a polish there, but nothing to grab you by the throat and shake you. This is the case with the latest version of Quicken which has received a wash and brush-up.

There are several enhancements to the reporting features. For example, EasyAnswer Reports are a set of pre-defined report templates that answer common questions such as "How much did I spend between June and September on eating out?" All you have to do is choose EasyAnswers from the Reports menu, select the appropriate question and make selections from drop-down lists. Using EasyAnswers makes it a doddle to create common reports about your finances.

You can now resize column widths in reports simply by dragging small markers between the column headings. You can show or hide report columns, too.

Quicken lets you group categories together into supercategories to give yourself a simplified picture when you report on your finances. For example, you could have separate categories for books, magazines and newspapers, but lump them together as a supercategory called "reading materials". You can then organise cash flow reports and summary reports by supercategory.

There are several enhancements to printing reports. For instance, you can now print a report on a single page (no matter how wide the report) and change the report orientation, to portrait or landscape, in the Print Report window. The Print Preview window now also shows your report in the font in which it will be printed.

Moving around Quicken has been made easier with the introduction of QuickTabs and the newly-designed HomeBase; a lift from Money but not half as attractive, which gives you almost one-click access to Quicken's most important features. Another new feature is EasyStep, which is a quick introduction to using Quicken's slightly more complicated features such as investment tracking and loan setups.

There are loads of Help features — which may indicate that Quicken has grown top-heavy. Flyover Help is a sort of bubble help that tells you what an icon does. The new QuickTours give you an overview of common Quicken tasks (Video QuickTours is available in Quicken Deluxe CD-ROM only, as is the on-screen manual). And Troubleshooting Help tries to answer the most frequently encountered problems. There's also Quicken Tips which at startup provides useful tips for achieving the best from Quicken.

There are loads of very small enhancements. For example, there are several new investment actions: you can transfer shares between accounts, accommodate corporate name changes, corporate securities spin-offs, corporate acquisitions (stock for stock), and stock dividends. In the Portfolio View you can sort your investments by security name, type, symbol, or any of the Custom View columns (like market value, estimated income, and percentage market value) just by clicking the heading. You can specify high, low, and volume for any investment price, link an investment account to a bank account that lets you hold uninvested cash, and write cheques.

Overall, I get the feeling that Intuit recognises the threat offered by Money, which now has an interface as crisp and clean as a banknote straight off the press and it's oh-so-easy to use. The weight and variety of help features in Quicken 5 is telling, as well as the efforts to spruce it up with HomeBase. There is more that can be done and I suspect more substantial changes are in the pipeline.

In the meantime, Quicken has loads of features, comes bundled with two additional and optional packages (QuickInvoice and Home Inventory) and, unlike Money which is Windows 95 specific, Quicken runs under 95 and Windows 3.1.

Paul Begg

PCW *Verdict*

Price £64.95; upgrade £44.95 (both prices include VAT)
Contact Intuit 0181 990 5500

Good Points It will do almost anything you want it to.
Bad Points Now a little top heavy and a bit daunting.
Conclusion A cosmetic upgrade.

HARDWARE

Kingston Turbochip 133 vs Make-it 586

Whizzer chips to upgrade your processor.

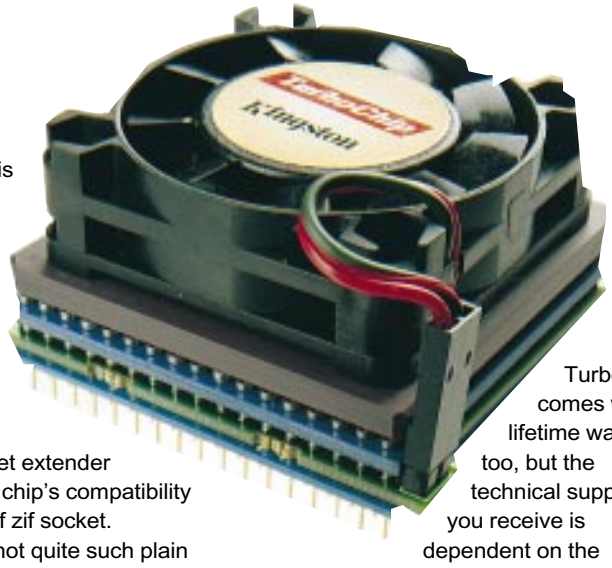
In a world where most new software requires Pentium-class power to operate effectively, the vast majority of machines in big corporations, small companies and homes are still 486s of one kind or another. Not surprisingly, chip manufacturers are falling over themselves to solve this problem in the form of overdrive upgrade processors.

Here, we've tested two of the lesser-known upgrade chips on the market: the Kingston Turbochip 133 and the Make-it 586 from Improve Technologies. Both chips are competitively priced to Intel's P24T overdrive chip and both make unbelievable claims: installation within minutes and performance increases of between 200 and 400 percent. Using an IBM system with a 486 DX/33 processor we tested both chips for ourselves.

The Make-it 586 is based on the Cyrix 5x86 100MHz processor and incorporates a 16Kb internal cache. It comes with a metal extraction tool for removing your existing 486 processor, a fan, a heat sink, and a small installation manual. The chip itself will upgrade 486SX and DX processors on 16, 20, 25, and 33MHz systems as well as DX2-66s.

Once you've removed the existing chip, installing the new Cyrix processor is a surprisingly straightforward procedure. Just line up the bevelled corner of the new chip with pin 1 and the processor slips straight in. The transparent fan then clips on top of the chip with its power cable plugging directly into the PC power supply. With everything in place, we turned on the machine and the new processor was recognised first time — no BIOS alterations, and no jumper settings to change.

The Kingston upgrade processor is based on the AMD Am5x86 and also has a 16Kb cache. It comes with a similar set of bits and pieces including a chip extractor too and a built-on cooling fan. There's also a socket extender which improves the chip's compatibility with certain styles of zif socket.



Installation was not quite such plain sailing this time. Although pin 1 was correctly aligned, the chip did not fall naturally into place and required a certain amount of pressure on each side. As before, we turned on the machine and the chip was recognised — no BIOS or jumper alterations. You don't have to worry about the fan as it's already stuck on to and powered by the chip rather than directly from the PC's power supply.

Using popular, everyday applications like the Microsoft Office Suite and CorelDraw, we put each chip through our VNU European Labs tests, noting before and after results. Interestingly, we found significant improvements in the cacheing of each chip after upgrading the machine's BIOS; the Kingston Turbochip producing an overall performance increase of 44 percent, and the Make-it 586 chalking up a 53 percent increase. These results compare with Intel's 83MHz overdrive chip which, on the same machine, achieved a massive 80 percent performance increase.

As I began writing this, Intel's overdrive chip was set at a price of £209. As I finished, the price had dropped to £149. Likewise, the Make-it 586 chip has dropped from £175 to £145, although the Kingston overdrive chip remains at £104.

Despite disappointing performance results, both chips tested here do offer serious competition to Intel's product. Both offer compatibility with a wide range of 486 machines and the Make-it 586 chip comes with an excellent warranty, return policy and technical support. Kingston's Turbochip comes with a lifetime warranty, too, but the technical support you receive is dependent on the reseller. With such a huge market in upgradable 486 machines, a further drop in price is to be expected over the next few months.

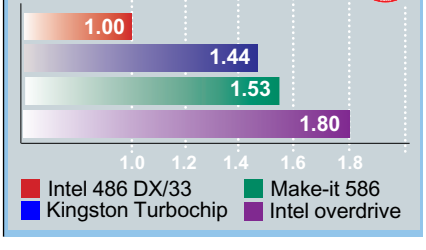
Eleanor Turton-Hill

● *See this month's* Hands On Hardware *(page 300) for full details of processor upgrades.*

Comparative

Performance Graph

Lab test



PCW Verdict

Make-it 586

Price £149 (plus VAT) expected street price
Contact 0181 498 2100

Good Points Fair results. Excellent technical support, warranty and return policy.
Bad Points Could be cheaper.
Conclusion Good, safe deal if you're not a hardware expert.

Kingston Turbochip

Price £104 (plus VAT)
Contact 01252 303500

Good Points Cheap.
Bad Points Disappointing performance results.
Conclusion Better option for experienced users.

HARDWARE

Hewlett-Packard LaserJet 5M

HP's latest, fast printers talk a new PCL.

The arrival of a new HP LaserJet printer is always cause for excitement and particularly so, if like this one, it accompanies a brand new version of the company's PCL (printer control language).

It has been two and a half years, in fact, since the announcement of the LaserJet 4 with PCL 5e — the "e" standing for the enhancements to support HP's first 600dpi printer. But there are no letters tagged on here. PCL 6 is a complete rewrite, this time using far more efficient object-orientated code.

The modular architecture of PCL 6 allows it to be easily modified or enhanced in the future while more efficient code, along with faster accompanying hardware, promises accelerated times to first page and return to application. PCL 6 commands closely match the graphical device interface (GDI) commands of Windows. Consequently, the printer driver can translate GDI to PCL 6 much faster and retain truer what-you-see-is-what-you-get output. PCL 6 is a printer language in its own right however, and differs from the dumb engines of cheap GDI printers which are completely reliant on the Windows GDI. PCL 5e is integrated into PCL 6, offering backward compatibility. The Windows drivers come in two portions: JetAdmin for network use, which requires 4.5Mb, and a selection of fonts — custom installation 2Mb, typical 6Mb, or 23Mb for the lot.

PCL 6 will be fitted to all future HP LaserJet printers but curiously the product line which débuts the language isn't titled, say, the LaserJet 6 series. The three new models are the LaserJet 5, 5N and 5M, which replace the 4Plus and 4MPlus workgroup printers. The letter N refers to Network ready in that it has built-in Ethernet support with 10-Base T and 10-Base 2 BNC ports along with HP's JetAdmin software. The letter M in HP's book still refers to Macintosh compatibility or, more specifically, PostScript fitted: like earlier LaserJet M models, the 5M also features the network options. Both the 5 and 5N may be fitted with an optional PostScript SIMM, and the 5 is also network upgradable.

PostScript for now is Adobe Level 2 flavoured. However, as we reported in last month's *Newsprint*, HP will not be supplying genuine Adobe PostScript from the middle of next year. Instead, the company will source PostScript from a clone, thereby saving itself lots of money without alienating the vast majority of its customers. If desired, you can still buy an official Adobe PostScript SIMM for your LaserJet printer but you'll have to get it from a third party; bad news for Adobe, which had to reveal that a whopping five percent of its total revenue last year came from licensing PostScript to HP LaserJet printers alone.

Back to the new printers. The new 5, 5N and 5M workgroup printers join the tiny 5L machine, the 5P and 5MP personal printers, the 5Si and 5SiMx network workhorses and the Colour LaserJet 5. Only the fast A3 4V and 4MV models are waiting to join the LaserJet 5 family.

The new printers resemble a sleeker, curvier version of the LaserJet 4's which they replace. The controls are well-designed, with a scrolling display, simpler options and a job-cancel button. All feature the same true 600 x 600dpi technology which, with resolution enhancement and microfine toner, produces superb quality.

The standard base tray has a 250-sheet capacity, while the multi-purpose input tray which folds out from the front holds an additional 100 sheets (or ten envelopes). An optional 500-sheet base tray increases the printer's maximum capacity to 850 sheets. It's quick too, with a 12ppm engine, new hardware-assisted compression and greyscaling, and a 33MHz processor, as opposed to the 4Plus and the 4MPlus's 25MHz chip. The 5 and 5N come with 4Mb memory expandable to 52Mb, while the 5M comes with 6Mb expandable to 38Mb.

Disappointingly, infra-red (IR) is an optional extra. This is particularly curious since HP is big in the IrDA committee and the 5P and 5MP IR-equipped models looked like they might start a trend. HP claims that its surveys indicate IR is low on the list of desires for workgroup printers, so left it off to save costs. In reality, IR adds very little to the cost of a printer like the LaserJet 5 and its absence comes across as a missed opportunity for the standard to gain momentum.

PCL 6 is a bit uninspirational, doing what PCL should have done a long time ago. The overall result is quicker than its predecessor but much of this is due to the 32 percent faster hardware.

Nevertheless, these are about the only blemishes on an otherwise great product from Hewlett-Packard. The company really doesn't muck about with printers, and the new 5's come up to expectations.

Gordon Laing

PCW Verdict

Price LaserJet 5 £1,220; LaserJet 5N £1,429; LaserJet 5M £1,659 (all prices excl. VAT)
Contact Hewlett-Packard 0990 474747

Good Points Great performance and output.
Bad Points No IR. PCL 6 hardly revolutionary.
Conclusion Another solid product from HP.

HARDWARE

Canon BJC-210

Surprising quality from a budget colour inkjet.

The BJC-210 is Canon's latest budget colour inkjet, providing 360 x 360dpi in colour mode and 720 x 360dpi in black and white. The BJC-210 follows the typical low-cost design with one three-colour cartridge, an upright input tray at the rear and a front panel which opens towards you. The colour cartridge can be swapped, as one would hope, for a black one for plain text printing.

In tests, the Canon BJC-210 produced some surprising results. Particularly noticeable was the high quality of solid blacks while in colour mode. Unlike four-colour printers, which boast a dedicated black, those with only three produce a composite black by mixing cyan, yellow and magenta. This frequently results in dark green or purple but on the BJC-210 composite black was virtually indistinguishable from the real thing.

One of the major goals of inkjet manufacturers is to develop the ability to print on almost any media, but the BJC-210 is evidence that research in the field of ink chemistry still has some way to go. On plain copier paper, colours appeared dull and grainy and certain shades of purple and brown came out very dark. On glossy paper or high gloss film, colours were completely transformed, becoming sharp, bright and crisp. So if you want excellent colour results you must first invest in high-quality inkjet paper. Using the black cartridge however, plain text printing produced near-laser quality output even on cheap copier paper.

Drivers for the BJC-210 are compatible with Windows 3.x and Windows 95 although both types are still 16-bit programs as they are wrapped up in a common setup routine. The driver is impressive however, giving a high degree of control over output quality with special settings for printing photographic images and graphics.

Eleanor Turton-Hill

PCW Verdict

Price £170 (plus VAT) street price
Contact Canon 0800 252223

Good Points Compact design. Excellent quality.
Bad Points Complex images are slow; results are very dependent on paper quality.
Conclusion An all-round good deal.

SOFTWARE

Attachmate Emissary 1.1

Browse the Web and open files — all from one application.

Drag & drop file management and snazzy email with Emissary

Emissary comes in a neat, CD-sized box with a friendly manual that lets you get going fast. Shame the boot procedure isn't as fast — it takes an age to load — so unless you leave your PC on all the time this could become tedious.

However, once you're in, you are presented with a default full-screen application, and anyone who likes Windows File Manager will feel at home right away with a directory tree on the left and scaleable window for file contents on the right. But the real difference is that right window: it also acts as a Web browser, email editor and, for certain files, an editable display. On top of that you can read news, Telnet and FTP via Emissary if you have an Internet connection. Emissary ships with its own TCP/IP stack, Runtime, but works just fine with Windows 95's own. There is support, too, for all major sound and graphics files.

Emissary can't read Office 95 files but is clever enough to launch the relevant applications externally. In the bottom left-hand corner sits a bin where you can drag and drop files, text, or Web shortcuts, either to use in interactive email (only available to other Emissary clients) or to insert in other files. The OLE-like technology is clever: you can drag and drop a typed Web address on to the browser button and off it goes to find it. Usually.

Emissary proved robust in most departments but was often flaky when it came to opening Web sites, especially if chosen from the directory tree or bin. Organising bookmarks is hard: you have to scroll down the left window just to get to the Web directory, which can get very big. And it can't cope with HTML 3.0 extensions.

It is useful, though, to interact with LAN file directories and the Internet and that is what makes Emissary stand out. But it needs developing because too many of its features are easily matched by Netscape 2.0, including email, newsgroup access and proxy server connections.

PJ Fisher

PCW Verdict

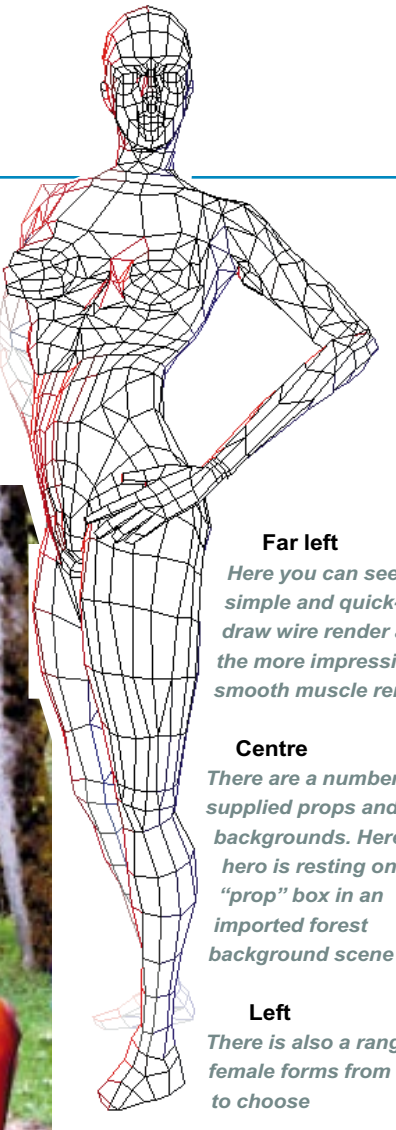
Price £115 (plus VAT)
Contact Attachmate 01734 890390; Web http://www.twg.com/emissary/emissnews.html

Good Points Drag-and-drop integration. Snazzy email. File management.
Bad Points Expensive. Web browser at least two generations behind Netscape. Won't view Office documents.
Conclusion Far too expensive for what it does.

SOFTWARE

Poser for Windows 95

Strike a pose with this figure-forming utility.



Far left
Here you can see the simple and quick-to-draw wire render and the more impressive smooth muscle render

Centre
There are a number of supplied props and backgrounds. Here, our hero is resting on a "prop" box in an imported forest background scene

Left
There is also a range of female forms from which to choose

Drawing human figures has traditionally been a skill that took years of practice to perfect, allowing competent figure artists to charge large sums for their years of toil at art colleges. Fractal Design is now claiming to be able to put that skill into the hands of anybody with a PC.

Poser, first launched for the Macintosh, has taken the best part of a year to reach Windows. It offers everything from a replacement of the traditional artist's mannequin to a powerful 3D image generation tool with a choice of backgrounds, surface textures and bump maps. Rendered figures can be exported for use with other paint and 3D graphics packages.

Launch the program and you will find yourself confronted with an outline figure within a window, or "studio". Clicking and holding any limb or joint allows the user to move it and create a pose. Trying to make the model move as you want can be tricky with the mouse alone so there are also "Parameter dials" with which the user can dictate the angle of each limb by typing in a number. Poser will allow you to contort joints into physically impossible positions, so achieving your desired pose without breaking the laws of nature can often prove difficult. However, a library of poses is supplied and this can be a useful starting point.

You will find a selection of male and female figure-types with different frames, weights and ages. If you can't find the model you want, you can select certain parts of the body to enlarge or reduce: if you were so inclined, you could create a Quasimodo with a massive chest and a head the size of a walnut.

The clear advantage Poser has over the artist's little wooden mannequin lies in its rendering facilities. There is a choice of stock surfaces: from an anatomically realistic skinless muscle, to tight-fitting cycling shorts and vest. Custom textures such as leopardskin or snakeskin can be imported and mapped onto your subject, creating some interesting effects. One annoying oversight is the lack of ability to create loose-fitting clothes or hair — a feature which, hopefully, will be included in future versions.

Your figure need not exist on its own. It is possible to create two figures in the same window — handy if you want a dancing couple, for instance, or an adult holding a child's hand. A limited range of stock props can be added, too, including a staircase, a block, a cane, or a ball. Custom objects can be introduced in the shape of an imported background. Any picture or photograph can be inserted behind the model, offering added realism.

Poser is a supremely useful utility that runs pretty well on low-spec machines. The recommended system requirements are a 486, or faster, running Windows 95. If you are interested snap up a copy quick as the price quoted below is a short introductory offer only. The Macintosh version is currently retailing at £149 (plus VAT).

PCW Verdict

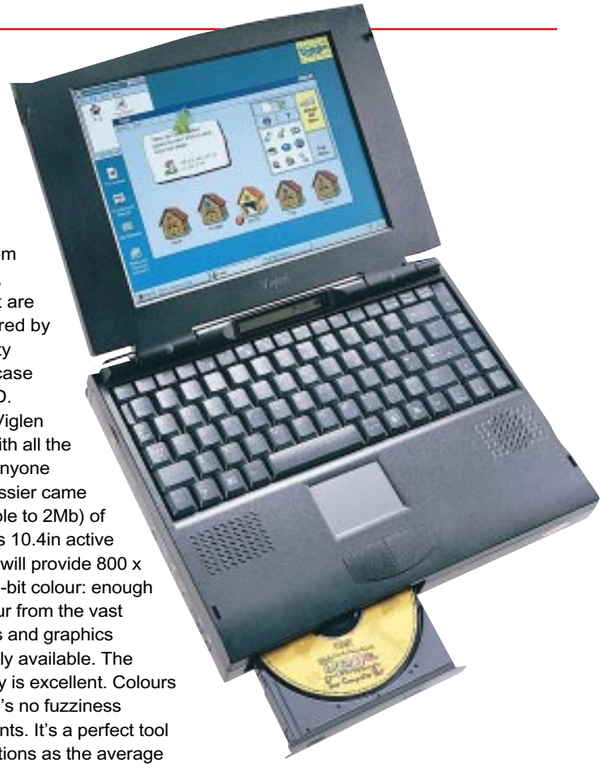
Price £89 (plus VAT) introductory offer; £149 (plus VAT) thereafter
Computers Unlimited 0181 200 8282

Good Points Easy-to-use interface.
Bad Points Lack of clothing facilities.
Conclusion Anyone who's serious about computer graphics should take a look.

HARDWARE

Viglen Dossier CD

You'll need a bit of muscle to carry this sturdy, bells-and-whistles notebook.



During the past few months we've had a lot of highly-specced notebooks come through the doors of *PCW* but this is the first time we've had the opportunity to get a good look at a Pentium 133MHz model.

Compared with many of the players in the market, Viglen is a relative newcomer to selling notebooks, but that hasn't dampened its ambitions for a share of the pie. The company has an excellent reputation for producing a well-built, reliable product and the Viglen Dossier CD comes across as maintaining this reputation. We couldn't help thinking that we'd seen this machine before; and the truth is, we have.

Viglen uses a company from Taiwan which makes notebook components for many other vendors in the market, so the Dossier isn't the most unique model available. But this is no bad thing. If you look at monitors from Apple, for instance, you'll find that most are actually manufactured by Sony and the quality remains, as is the case with the Dossier CD.

The model that Viglen sent us was filled with all the bells and whistles anyone could want. Our Dossier came with 1Mb (upgradable to 2Mb) of video memory for its 10.4in active matrix screen. This will provide 800 x 600 resolution in 16-bit colour: enough to get the best colour from the vast majority of business and graphics applications currently available. The quality of the display is excellent. Colours are sharp and there's no fuzziness affecting icons or fonts. It's a perfect tool for mobile presentations as the average viewing angle of an active matrix screen is 70 to 80 degrees, or about twice that of a dual-scan display. If needs be, you can make use of an external monitor and achieve a comfortable 1024 x 768 display in 8-bit colour or 1200 x 1024 in 4-bit colour.

As its name implies, the Dossier CD comes with a fixed, quad-speed CD-ROM (by Toshiba) as well as a fixed 3.5in floppy. No module swapping or plugging-in cable for external drives is needed here. Sound capability is included via the use of an integrated Opti 930 16-bit sound chip. This allows for stereo sound via the two wrist-rest speakers but as with almost all in-built notebook speakers the sound is quite tinny and weak. There are three audio jacks for line in, speaker out and microphone in.

The Dossier CD external connections consist of a PS/2 mouse/keyboard, enhanced serial, enhanced parallel, game/Midi, infra-red and VGA ports, all located at the rear. If you want, Viglen can provide you with a PCI mini docking station, into which you can plug the Dossier, for greater home or office flexibility.

There's a removable 1.2Gb hard drive (upgradable to a massive 2.1Gb), one Type II and one Type III PCMCIA slot which can be used simultaneously. There's a rather large Duracell NiMH battery too, that will give you 1.5 hours of battery life.

With a Pentium 133MHz CPU, 256Kb of pipeline burst cache and 16Mb of RAM (upgradable to 40Mb) its Windows 95 performance, in tests, was a slightly disappointing ten percent above the Toshiba Pentium 90-based benchmark.

The look and feel of the Dossier CD itself is somewhat stylish but lacks the finesse of the better known (and higher priced) brands. There's plenty of wrist-rest room for typing and a slightly off-centre Glide-Pad controls the mouse function, while the battery, disk and power status are shown on an LCD display.

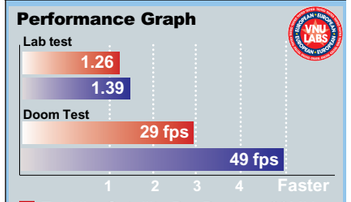
The Dossier CD is a solid machine. Perhaps even a bit too solid: at 3.6kg it's the heaviest notebook we've seen — and that doesn't including carrying the AC adaptor about. This extra weight comes from the permanent presence of the CD and floppy disk drives so the trade-off made here is all-in-one versatility over portability.

On the whole, the Dossier CD does all right, and the beauty of it is that if you can't afford the £2,884 (plus VAT) top-of-the-line Pentium 133 model, you can always start with the entry-level Pentium 75 dual-scan display model with 540Mb HDD and 8Mb RAM for £1,990 (plus VAT). Either way you'll be sorted.

Dylan Armbrust

Comparative

Performance Graph



PCW Verdict

Price £2,884 (plus VAT)
Contact Viglen 0181 758 7000

Good Points Crisp display. Everything built-in. Carry-bag included.
Bad Points Slightly heavy at 3.6kg and not particularly unique.
Conclusion A feature-packed notebook that offers fair value for money.

HARDWARE

Toshiba TF 461

Fax, low, print print low, goes this combo.

Toshiba has an amazing reputation for notebooks, but none of its other products have ever really hit home. The 461 is a combined fax machine and printer but it is a device which shows that Hewlett-Packard still leads the field in this respect. The print mechanism is provided by Lexmark but proved to be slow and not particularly good, with a little banding and too much ink on the paper. It was also astonishingly slow.

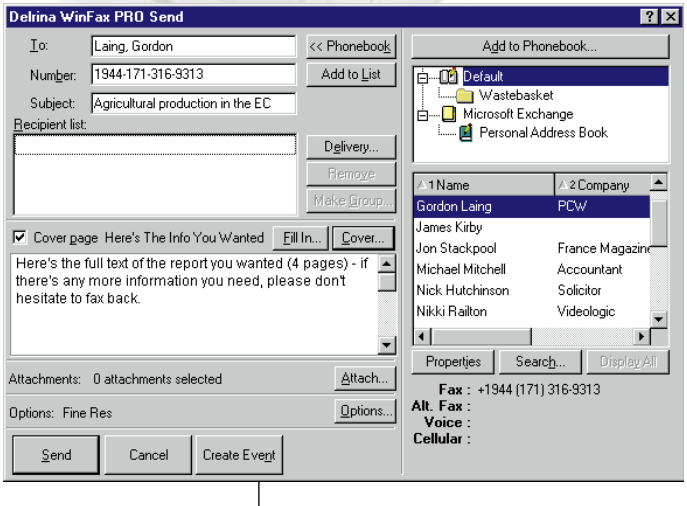
The fax side is pretty standard Group 3 stuff but where the 461 really disappoints is in the missed opportunities. It was supplied with a Windows 3.x driver that installs using a DOS-based program. The antiquated software is matched by a similarly user-hostile interface on the fax machine which requires two-digit codes to be typed in. The machine could not be set up without the manual and even then there is a fair bit of trial and error involved.

The doubling-up of the inkjet mechanism is half-baked: if you *must* have a printer for your fax machine, then you might as well put on a parallel interface to allow the computer to use it as a printer. But once you do this, you should look at some other embellishments. It should be possible to use the device as a fax-modem and as a scanner. The 461 does this but Toshiba charges an extra £100 for the software (Winfax Pro) and cable: with an RRP of £650 (plus VAT) for the basic unit, this is over the top. The printer has a colour option but won't copy mono documents unless the mono cartridge is installed. The scanner is monochrome.

As a printer, the performance is lamentable. Our VNU Labs test showed it to be slower and very much worse than cheap inkjets, with particularly atrocious performance when dealing with white text on a black background. The print engine puts far too much ink on the paper. Better printer paper would help alleviate this problem but in an application where you might get pages of junk faxes, you don't want to keep expensive paper in the hopper. In some cases you'd get a more legible result from a thermal fax than from the 461.

If the unit were bargain-basement priced then the need to re-cable and re-plug ink cartridges would be forgivable, but at this price you would expect something which, like the OfficeJet, had good Windows 95 support, setup through the computer software and used a bi-directional parallel cable as just that. Colour scanning and, potentially, colour faxing would be an easy and sensible addition. As it is, there are plenty of better and cheaper solutions: the best bet wears the Hewlett-Packard OfficeJet badge.

Simon Rockman



If you want to send and receive faxes with your computer, you'll need additional software. Toshiba recommends Delrina Winfax Pro, above

PCW Verdict

Price £649 (plus VAT)
Contact Toshiba 0800 525106

Good Points Small footprint.
Bad Points Cost. Performance. Lacks ease of use.
Conclusion Don't blame us if you buy one.

SOFTWARE

MacroMedia Extreme 3D

A fast trip into the world of 3D modelling.

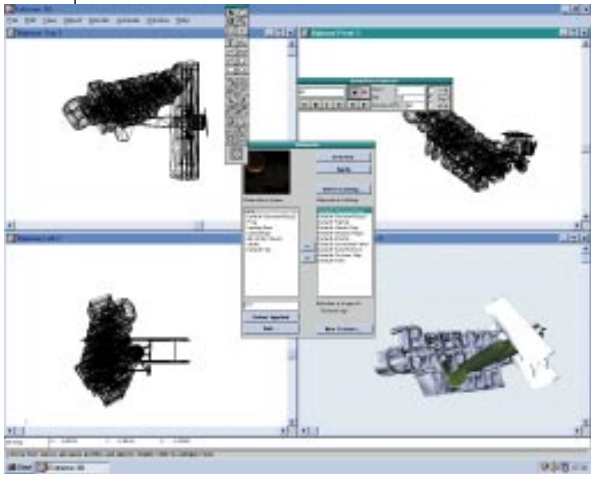
Like RayDream Studio, Trispectives and TrueSpace 2, Extreme 3D is a 3D animation program. The grandaddy of these packages is Autodesk 3D studio, where the renderer is most important, followed by the modeller as a necessary front-end, leaving the animator as a way of converting a number of single frames into a movie. Extreme 3D turns this combination of modeller-renderer-animator upside-down. The renderer is not only the least important aspect of the program, it's the weakest. The modeller and animator are both excellent. There is full support for TrueType fonts and the program is supplied with 500 fonts.

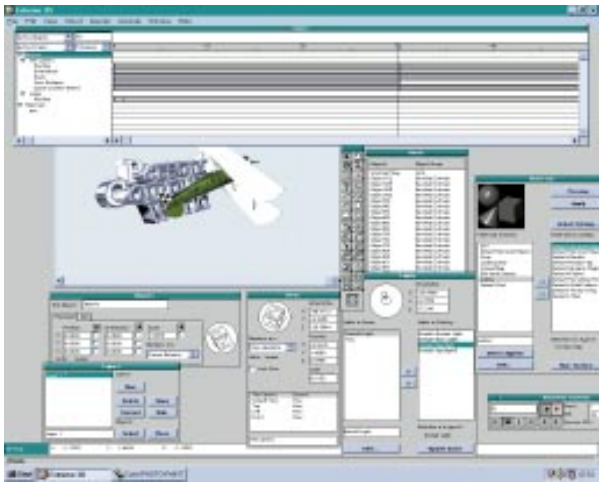
How do you represent a 3D world on a 2D computer screen? The solution has to be a 2D view of a 3D world and this is where the problems usually begin. Extreme 3D uses a system whereby shapes are described on a plane, which is usually parallel to the screen. The shape is then worked on to give it a 3D form. By moving the viewing angle you can change the plane on which you work within the 3D world. This is an excellent approach, and unlike that used by any other modelling packages.

The usual way to produce a shape is to define a profile and then extrude it. Extreme's tools to define the profile will be familiar to most people who are used to a 2D drawing package and include polylines and splines. There is a tool to produce Bezier curves and a set of standard shapes such as circles, ellipses, squares and regular polygons. There are also 2D tools to convert polylines to splines, to trim, offset and fillet, which rounds the corners of a shape.

The 2D shape is extruded, or lathed, to turn it into a 3D shape. One form of extrusion is called a sweep — it takes one shape along a path defined by the profile. You can scale the first shape as it travels down this path. If you have built up a skeleton of a shape you can clothe it with the "skin" command. More conventionally, you can build up objects from cross-sections. The built object can then be twisted, bent, tapered or skewed. All these tools are great for defining building blocks which can then be amalgamated to form a final model and there is a variety of construction tools to help you get this alignment correct.

The processes of 3D modelling. Build your shape and view it in wireframe before committing to a lengthy render





Once you've built all the players in your scene, you will want to light and texture them. Here, the software doesn't seem as flexible as that in some other packages because the 2D slice in a 3D world approach doesn't work as well. You can load in textures from a bitmap drawing package but we found it very difficult to get the right bit of a texture in the right place on a shape: mapping a bitmap dinner jacket onto a 3D torso would be very difficult.

The animation uses a "score" which is a time-line of events: this is a similar system to that employed by other packages and it's easy to define the keyframes. The software tweens effectively but it's not a great animator; there are no options for things like "gate" where a character walks to predefined paths.

But of all the aspects of this program, the one which is most disappointing is the renderer. It's important to realise that Extreme 3D is *not* a ray-tracing program. It estimates what a surface looks like, so shadows are not properly calculated. You can't project light through a stained glass window, and most seriously you won't see one object reflected in the mirror finish of another. You can fudge the effect by viewing the scene from the viewpoint of the shiny object, capturing that as an environment map for the shiny object and then mapping it on, but this is limited to each angle of view — not what the program is supposed to be about. Nevertheless, for adequate images Extreme 3D is a breeze to use.

You can model very fast, so if getting up and running quickly, rather than ultimate quality, is the prime consideration then this is the package for you. If you need the ultimate in shiny surface control then look elsewhere.

Extreme 3D alone costs £549 (plus VAT) but surely the more sensible choice would be to go for the Freehand Graphics Studio, which includes Freehand 5, Fontographer, X-RES *and* Extreme 3D for an incredible £494 (plus VAT) — surely the bargain of the year.

Simon Rockman

PCW Verdict

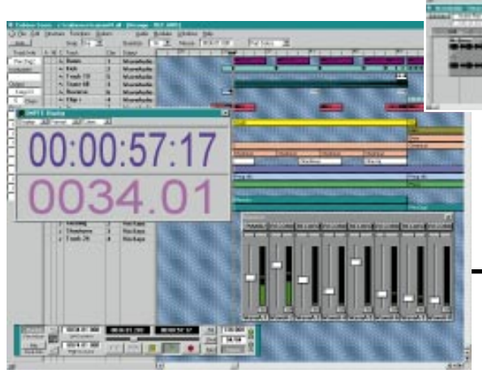
Price £549 (plus VAT)
Contact Computers Unlimited 0181 200 8282

Good Points The best modeller on the market.
Bad Points Tied to a lukewarm renderer.
Conclusion Movies made easy.

SOFTWARE

Steinberg Cubase 3.0

Classic MIDI sequencing package, with full audio capability.



Above *Cubase 3.0 can trigger digital audio samples with the same ease as conventional sequenced elements*
Left *Faders, transport controls, and don't lose that timecode!*

Last December Steinberg released version 2.0 of Cubase, its industry-standard MIDI sequencing package. Less than six months on, and barely long enough for users to uncover the new features in version 2.0, the new version 3.0 comes along with yet another stack of new features. This time around, though, the emphasis is on digital audio.

Ever since MIDI appeared in the early eighties, musicians have been connecting synthesisers to computers to record and edit their performances using sequencing programs. Because MIDI information consists of very short, simple messages describing such things as which note was hit, how hard and held for how long, you don't need a powerful computer to sequence tracks of MIDI data. To manipulate digital audio in the same way, however, requires heaps of processing power and this is something that has only recently become available on the desktop PC.

With version 3.0, Cubase now offers full audio capability across its entire range as a standard feature. The number of audio tracks Cubase can play back largely depends on your PC and how it is configured. A Pentium system fitted with 16Mb RAM is needed to play the maximum of eight 16-bit stereo tracks at 44.1kHz.

Just as important as a fast processor and huge quantities of RAM is a fast hard disk. Because audio files are too large to fit into RAM (up to 10Mb per minute) they are "recorded" directly to disk. To play what is effectively 16 tracks of audio, the disk must sustain around 3Mb per second for glitchless playback. Therefore, a fast enhanced IDE (EIDE) or SCSI-2 drive is essential.

Cubase 3 supports any 16-bit Windows-compatible sound card. A duplex card such as the Turtle Beach Tropez is recommended, though, for simultaneous record and playback.

MIDI and audio are seamlessly integrated in the arrange window to the extent that anything that can be done with MIDI, can be done with audio. This includes the way in which tracks are recorded, parts moved around and so on. When an audio section has been recorded, it can be displayed as a name, or as an image of the waveform. You can trim and move parts around from the arrange window, but for greater accuracy you can open up the editor by double-clicking on the section.

The audio editor allows you to zoom in on the waveform and define the start and end points for any section. This is done by dragging handles at the beginning and end of each sample. The bar ruler displayed at the top of the window makes it easy to position audio parts accurately. The start points of each sample, or part, can also be quantised in the same way that MIDI information can. All audio editing in this window is non-destructive, which means the edits you perform only effect a "virtual" copy of the original recording.

The Audio Pool is where your samples, or recordings, are administered. It displays each recording and any images made from it. From here you can listen to each take, normalise, time-stretch and apply other effects. Time-stretching is an invaluable feature that enables you to slow down or speed up recordings without changing pitch. It is usually applied by defining a ratio, or a percentage, of the sample to be effected. Cubase makes it really easy and only requires you to enter the required tempo of the sample you want.

Wavelab Lite, a cut-down version of Steinberg's 32-bit wave editor (reviewed last month) is bundled with the package, should you need to edit samples at low-level. The program is integrated with Cubase and opens files for editing when they are double clicked. Wavelab Lite provides all the features you would expect from a wave editor, along with a parametric graphic equaliser — you will need Windows 95 or NT to run it, though. If you prefer to use another editor, this can be set from within Cubase to be opened when a file needs to be edited.

Anybody who knows Cubase will only need to spend half an hour or so to learn the audio features: everything is so straightforward and, more importantly, quick to use. The only niggles I have are that you cannot group tracks and there isn't a way to record fades and panning information in real time. Overall, though, this is an excellent buy and pricing hasn't been affected with the addition of audio.

There are three versions of Cubase 3.0: the standard costs £329, Cubase Score 3.0 offers additional scoring facilities for £499, and Cubase 3.0 XT (£699) supports additional professional music hardware such as the Session 8 and Yamaha CBX-D5 (prices include VAT).

Steven Helstrip

PCW*Verdict*

Price Standard £329 (incl VAT)
Contact Harman Audio 0181 207 5050

Good Points Easy and quick to learn and use. 32-bit audio editing.
Bad Points Creating a fade is a tad cumbersome.
Conclusion The best sequencing package just got better.

SOFTWARE

SoftWindows 95

If you need Win95 emulation on your PowerMac — here it is.

When Apple launched the original range of PowerMacs in 1994, most configurations included a copy of Insignia Solutions' SoftWindows. The aim was to show potential users that you could move from PC to PowerMac without sacrificing your investment in existing software. The Windows emulation was slow and ran only in standard mode but no-one could deny that it did what it promised. Insignia's latest product is SoftWindows 95, designed to emulate an Intel 486DX PC running Windows 95.

Supplied on a single CD-ROM, SoftWindows 95 runs on any PowerMac with 16Mb of RAM and System 7.1 or higher. Insignia claims its new code is 35 percent faster than SoftWindows 2.0 and guarantees total compatibility with all Windows 95 applications.

Once SoftWindows 95 is installed, it needs to be configured to your system for the best results. There are three main features to take into account: PC Extended memory, Deltacache and the Desktop size. Each of these has an affect on the program's performance and the amount of RAM needed to run it. It's basically a case of the more memory you give to the emulation, the better it will run, and the amount of free memory available is displayed at the bottom of the screen.

Once configured, the PC boots up and eventually the Windows 95 desktop appears. As SoftWindows 95 is emulating a PC running Microsoft software, everything looks the same as it does on a *bona fide* Wintel machine. Going to the Start menu brings up the Programs and Document menus. Calling up Explorer or going to My Computer and clicking on the hard disk icon displays a directory of Drive C. By default this is a 130Mb file on the Mac's hard disk, although it can be expanded up to 256Mb using an additional utility.

From this point on you can install and run Windows applications and cut and paste data from Windows to the Mac and vice versa. The display resolution can be set up to 1024 x 768 pixels but all modes are limited to 256 colours. SoftWindows can make direct use of the Mac's floppy and CD-ROM drives as if they were PC devices, and while the Mac can't see the data stored in the PC's hard disk file, shared folders can be made to work between the two systems.

Yes, it's Windows 95, running on a Macintosh using software emulation. It's slow, but it works

Features new to the Windows 95 version include PC SCSI support, MIDI handling and improved network support. The former lets you access Mac SCSI devices from the Windows environment and allows you to work with items such as PC-formatted hard disks, ZIP drives, Syquests and scanners.

Using QuickTime's General MIDI technology, you can now play back PC MIDI files as well as standard .WAV files. SoftWindows 95 boasts SoundBlaster compatibility but this option is not available in DOS. You won't hear the music in your favourite games but titles like Microsoft Encarta 96 and Cinemania are fully compatible.

The improved networking options now give built-in support for Novell Netware 4 and Microsoft LAN Manager and SoftWindows users can link directly to other Windows 95 users on the same network. However, testing this particular feature over our Novell setup required a lot of messing about with DOS configuration files and in the end I still couldn't get it to work. Whatever happened to plug and play?

Other new bits in SoftWindows 95 include better PC printing and a nice touch entitled TurboStart. This lets you get into Windows 95 much faster than normal, with all your programs and documents as you left them, by taking a snapshot of the last session and loading it back on restart.

Aside from problems with the network setup, SoftWindows worked with everything we threw at it including Office 95 and several CD-ROM titles. However, emulation speed is still its biggest problem. The program is far too slow for day-to-day use, even running on a 132MHz 604 with 48Mb of RAM.

If you really want to run Windows 95 on your PowerMac, then SoftWindows 95 is the cheapest solution at the moment. But that's really all you can say about it.

Chris Cain

PCW*Verdict*

Price £287.92 (plus VAT); upgrade from older version £90.75 (plus VAT)
Contact Insignia Solutions 0800 667706

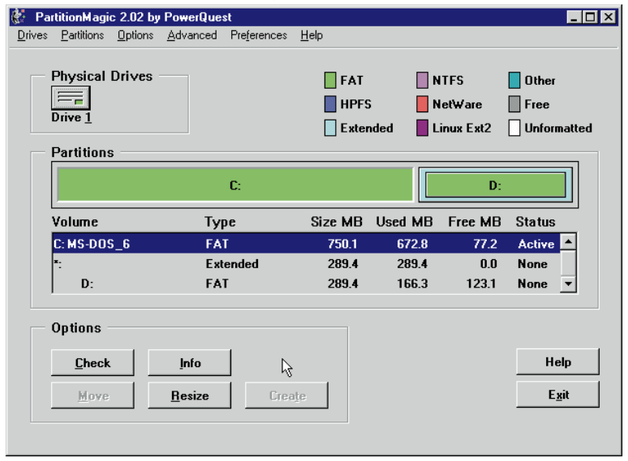
Good Points Excellent emulation. Cheaper than hardware.
Bad Points Painfully slow.
Conclusion Useful only if you desperately need Windows 95 on your Mac.

SOFTWARE

PartitionMagic 2.0

Get more from your hard disk and partitions.

PartitionMagic eliminates the fear of partitioning your hard disk



Partitioning your hard drive is useful if you want to run more than one operating system or simply organise different types of files, but how about all your applications on drive C and documents on drive D? It's a scary thing to do unless you really know what you're at. PartitionMagic doesn't make it any less scary but it certainly makes it easier.

It's an odd program. It installs into Windows 95 but only runs from DOS and when opened it presents a Windows 95-style interface! Despite the manual's suggestion, don't reset the properties of PartitionMagic in Windows so that it defaults to DOS when you launch it: you lose mouse control. It's better to launch DOS and run PartitionMagic from its directory.

But the interface couldn't be simpler. Drives and partitions are graphically represented and all operations are easily controlled by on-click buttons or slider bars. You can create new partitions, delete old ones and resize existing ones. Partitions can be checked for bad sectors. For the brave, it's also simple to format or delete a partition — so be careful who you let loose on it.

As you would expect, FAT and HPFS are supported, but the more eclectic file systems such as NTFS (New Technology File System) developed for Windows NT and OS/2 are there as well. This makes it an excellent utility for creating multi-boot PCs.

For example, it takes just five steps to free-up space on a Windows-equipped PC to add OS/2 and create space for a Boot Manager at the beginning of drive C. After that, install OS/2 onto the new drive with OS/2's FDisk utility.

If you understand partitioning, this is an excellent utility which performs complex procedures unbelievably easily.

PJ Fisher

PCW Verdict

Price £65.74 (incl VAT, postage and packing)
Contact POW Distribution 01202 716726

Good Points One-shot partitioning. Highly flexible.
Bad Points Only works in DOS. Could be dangerous in the wrong hands.
Conclusion A good-value, genuinely useful utility.

SOFTWARE

TypeReader Professional 3.0XA

Document scanning a-go-go.

Optical Character Recognition (OCR) is the incredibly useful and time-saving process whereby a computer automatically converts scanned pages of words into editable text documents, saving you all the work of re-typing.

TypeReader provides a single button which automatically scans, selects regions, then converts words to text, although you can carry out these operations singly. In the few tests we have carried out, it has proven more accurate and faster than both OmniPage Pro and WordScan Plus, the two market leaders.

After the material has been recognised, you can switch views between the original image and the results in order to correct any highlighted, uncertain characters. An on-screen verifier in a pop-up window displays that part of the original image corresponding to the selected, recognised, text.

There's an option to create deferred jobs — batch jobs that scan now and recognise later. You can also create, save and load templates which can be used to tell the program to recognise only specific parts of each page.

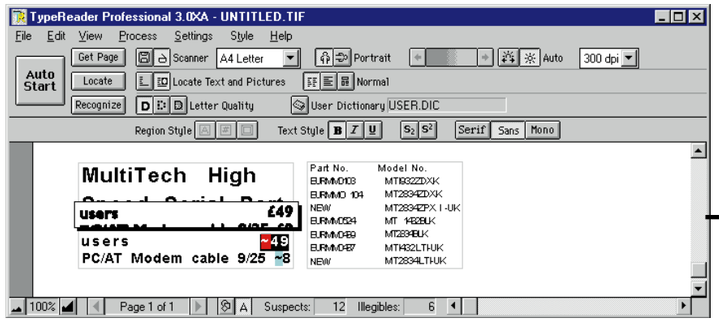
There are standard word processing functions for editing the recognised text, including a user dictionary. There are specialised dictionaries too, including geographic, medical and legal versions.

Type that is skewed (crooked) on a page cannot be located and recognised very accurately by OCR programs: you can fix the problem by adjusting the paper so that text is scanned in straight, but this is not always possible. TypeReader can automatically rotate, and thus straighten, pages if they are skewed up to 15 degrees.

You can distinguish between text and picture regions and you can re-create tables and pages where text wraps around a picture. The program can recognise and retain bold, italic and underlined text, as well as superscripts and subscripts, and it can map the recognised text to three approximate fonts of your choice.

TypeReader Professional isn't cheap. It is priced in line with the high-end OCR products which it beats in terms of accuracy and speed.

Panicos Georghiades and Gabriel Jacobs



Fast and accurate optical character recognition from TypeReader

PCW Verdict

Price £495 (plus VAT); competitive upgrades £215 (plus VAT)
Contact Tekware 01384 392121

Good Points Faster and more accurate than the main competition.
Bad Points None.
Conclusion If speed and accuracy are your main OCR requirements, this is a good buy.

SOFTWARE

Stardraw 2D

Plan a stage lighting rig — but don't try this at home, folks.

Stardraw is a computer-aided design package aimed at stage lighting designers. The company, Starlite Systems, specialises in stage lighting equipment as well as CAD. What Stardraw will do is produce plan drawings of a lighting rig for assembly on-site. What it won't do is design and model a lighting plot — you'd need 3D drawing and rendering for that.

Stardraw is a 32-bit application and comes on two disks, with three more for installing the Win32s extensions — necessary if you want to run under Windows 3.1. It also comes with a "dongle", an anti-piracy device that you have to connect to your parallel port. Though Stardraw will run without this, it will neither print nor save files.

Stardrawing can be a very long-winded business. If you want to draw a precisely sized and placed rectangle, you first draw it roughly with the mouse, then edit its "properties" to fine-tune the dimensions and position. Similarly, if you want to draw an arc or a pie section you have to edit an existing circle. For general CAD it can't really be taken seriously: the drawing tools are too basic, there are no editing tools such as trimming or chamfering, and dimensioning is primitive, to put it kindly.

Where it starts to get more promising is with the 266 bundled symbols. These consist of drawings of lights, gantries, control desks and other equipment, drawn to scale. It also includes kit from Strand, Clay Paky, Selecon and other companies. You insert these from a cascading menu, and can create your own symbols, too. Click on the "Properties" of a symbol and as well as the drawing attributes you get a whole load of user-definable fields such as Weight, Hire cost, Fader channel, Lamp, or Gel — there's a built-in library of over 300 coloured filters.

All this information can be printed out as a report. Pressing a button switches to "Report view" with the information displayed in a table and the totals shown where appropriate. The bundled symbols have some of the attributes already defined but here I began to have doubts about the care that had gone into this: can a 4.8 metre beam really weigh just one kilogram?

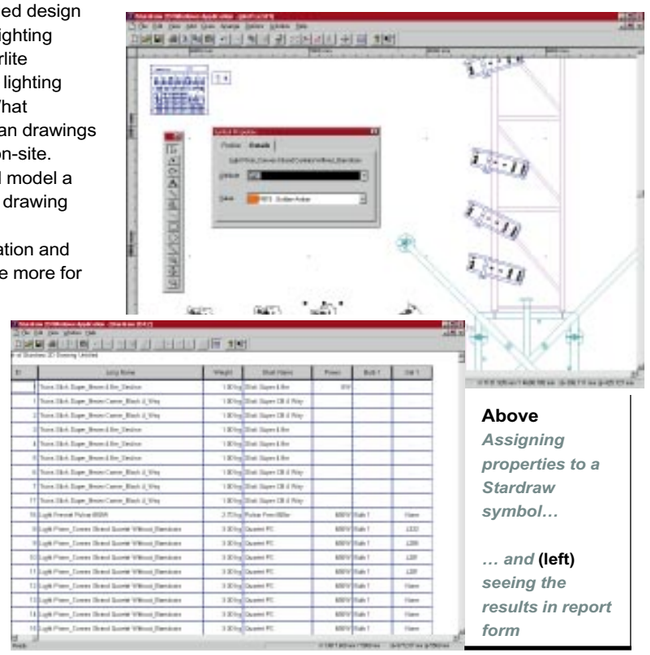
Although user-defined attributes don't appear by default on the drawing, you can choose to show them as text superimposed on the symbol, so, for example, you could show the wattage of every light. You can add a "legend" to your drawing, showing a list of symbols against their descriptions, like a map key, but this too is bugged — the larger the original symbol, the smaller the descriptive text.

On-line help is frankly appalling, consisting solely of a list of menu commands — there's no overview and little explanation. The 75-page printed manual does somewhat better but is still too brief and poorly indexed.

You can "drive" Stardraw via Visual Basic or Visual C++ and the manual contains some sample code for doing this. It also states, wrongly, that Microsoft Word "comes with Visual Basic" and makes reference to a sample file that isn't supplied, so I wasn't able to test this feature.

Stardraw claims to import the Autodesk standard DXF files as well as Windows and CorelDraw 4 metafiles. However, DXF files from four different applications were all badly broken on import. You can't export drawings or reports to a different format, nor, it seems, can you copy them via the clipboard to other applications. Attempting to insert a Stardraw OLE object into a variety of other applications failed, too.

What Stardraw has in abundance is room for improvement. For under £100 you can get better CAD: Autosketch, Turbocad and Drafix QuickCAD all leave Stardraw standing in terms of drawing facilities; all support symbol libraries and the last will also export reports of non-graphic attributes to a spreadsheet or database. What you are paying for here is the specific lighting symbol and gel libraries. If you need these, then Starlite Systems has got you by the proverbials; and the near-paranoid armoury of dongles and lack of export facilities means they plan to keep it that way.



Above
Assigning properties to a Stardraw symbol...

... and **(left)** *seeing the results in report form*

Tim Nott

PCW Verdict

Price £295 (plus VAT); £100 (plus VAT) for Stardraw 3D users
Contact Starlite Systems Technology 0171 511 4400

Good Points Report generation and a good range of symbol libraries for stage-lighting designers.
Bad Points Poor documentation. Expensive. No export. Mediocre CAD features.
Conclusion Eminently resistible unless you're a stage-lighting professional.

SOFTWARE

Forehelp 2.95

You'll never walk alone with this standalone help authoring tool.

Windows help is great for end-users but painful for developers. Every Windows installation includes a program called Winhelp, a viewer for hypertext files in the familiar .HLP format. The format of an .HLP file is not documented, so the only way to create one is by using Microsoft's help compiler bundled with most Windows development tools.

The help compiler munches on a collection of source files — the main one being a document in Rich Text Format (RTF) — and if you are lucky spits out a help file at the end. The tricky bit is formatting the source document in a way the compiler understands, using such things as footnotes and hidden text codes to structure it correctly. The more ambitious your help file, the more difficult it becomes. A help authoring tool simplifies matters greatly and is almost essential for complex projects.

Forehelp is the best of a number of products available. Some help authoring tools are Word add-on products but Forehelp is a standalone tool, with the shrink-wrap containing all you need including the Microsoft compiler. Version 2.0 runs on any version of Windows, and 2.95 runs on Windows 95 but can also create 3.1 help files: the reason for two versions is that the Windows 95 help engine supports a host of features not available in older versions of Windows.

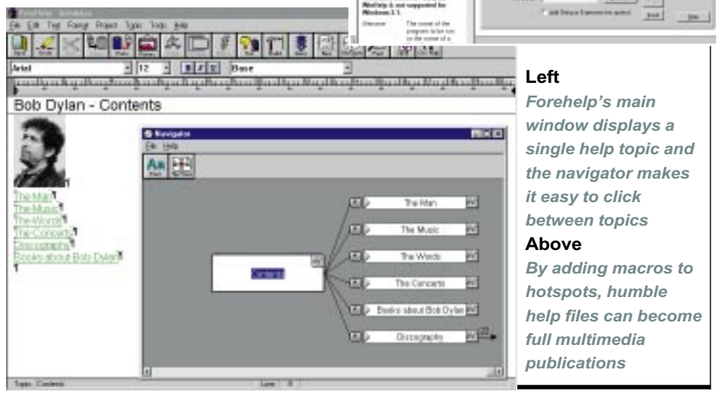
The main Forehelp Window looks like a cross between a word processor and the Windows help viewer itself. The basic unit of any help file is a topic and in Forehelp you edit topics by typing into this main window. Creating simple help files is simplicity itself. When you start a new project, Forehelp prompts you to create a first topic called Contents. Click OK, and type a list of further topic names. Then, select the list and choose Tools — Make Multiple Jumps. Forehelp automatically creates a topic for each item. If you now press Control and click an item, its topic comes up for editing. Once you have entered the text, Alt-C returns to the table of contents. There is a Test button which runs the help file almost exactly as it will look when finished, and finally you can click Build to generate and compile the RTF source code.

Simple help files may be easy but larger projects inevitably become complex. One problem is preserving a sensible structure and Forehelp's Grapher tool assists by displaying a tree view of the whole project. The Navigator window shows the relationship of a topic to its neighbours, giving point-and-click navigation between topics. There is a spell-checker and thesaurus, and the editor supports user-defined paragraph styles for quick, consistent text formatting. Bitmaps can be imported, with a double-click placing them into "Sheg editor" mode — a reference to the segmented hypergraphic (.SHG) files which the compiler uses to create hotspot areas on a picture. For example, you could import a screenshot from your application and have explanatory pop-up windows appear as the user clicks different parts.

Building effective context-sensitive help into an application is not trivial. The programmer has to include context numbers that identify the help topic to be displayed. Forehelp can generate a context map file which defines numeric constants that programmers can include in an application. Developers will also make use of Winhelp macros, easily added to a hotspot by choosing from a scrolling list. These macros call routines in the Winhelp dynamic link library. For example, you can enable and disable buttons in your help system, run other help files or execute other Windows applications. You can define your own macros which call the Windows API or your own DLL code, making the help system totally extensible.

In many cases, online help goes hand in hand with printed documentation. Forehelp can generate a manual in rich text format, preserving any styles used. It will also convert pop-up windows into a glossary section. It's a useful feature, but developers wanting to co-ordinate printed and online help may prefer one of the tools that works as an add-on to Word, such as WexTech's Doc-to-help. Forehelp is otherwise outstanding and can serve not only as a utility for application developers, but also as an easy-to-use multimedia authoring tool.

Tim Anderson



Left
Forehelp's main window displays a single help topic and the navigator makes it easy to click between topics
Above
By adding macros to hotspots, humble help files can become full multimedia publications

PCW Verdict

Price £295 (plus VAT)
Contact Oxford Computer Consultants 01203 690934

Good Points Rich features. Ease of use. Full Windows 95 support.
Bad Points A Word add-on is better when a printed version is needed.
Conclusion The best help authoring tool available.

Long term tests

PCW How You Can Contribute To The Long Term Tests Section

We welcome contributions from readers for our Long Term Tests section. If you've been using a piece of hardware or software intensively for some time, just write a 450-word article (for hardware) or a 750-word piece with screenshot — GIF format — for software and send it on disk, in MS Word (Mac or PC) or ASCII format, to: Adele Dyer, Personal Computer World, VNU House, 32-34 Broadwick Street, London W1A 2HG. Mark your envelope clearly "Long Term Tests". Or email it to adele@cix.compulink.co.uk. We'll pay for any contributions we use.

HARDWARE

Lexmark ExecJet IIc 4076

9 MONTH TEST

A well-built, adaptable printer that laps up graphics and graphic fonts. But it can be a bit on the smudgy side.

IN SEPTEMBER 1995 MY LEXMARK ExecJet IIc 4076 cost £249 in the high street (close to mail order prices). I had selected this particular printer, despite having read some lukewarm reviews, to replace my huge Mannesmann Tally MT330 24-pin matrix printer.

One of my requirements had been that I needed DOS as well as Windows printing. LocoScript Pro 2 is a DOS application which is an enhanced version of the package shipped with the Amstrad PCW range of dedicated word processors, so for this I installed the HP DeskJet 500C printer driver which worked well.

I had intended to use colour from LocoScript, but it transpired that colour is available only in raster images and not while printing text, and there is no set of escape codes available to select printing in colour. This was a disappointment about which I could not have known by reading the manual; indeed, getting any support from Lexmark has been quite hard work compared with Mannesmann Tally. All such problems with colour vanish, of course, when printing from Windows.

The old MT330 used to handle graphics and graphic fonts badly, yet my Lexmark laps them up. The Windows 3.x driver is well integrated and gives sensible warnings if you try to print a colour document with the black ink cartridge loaded, for instance.

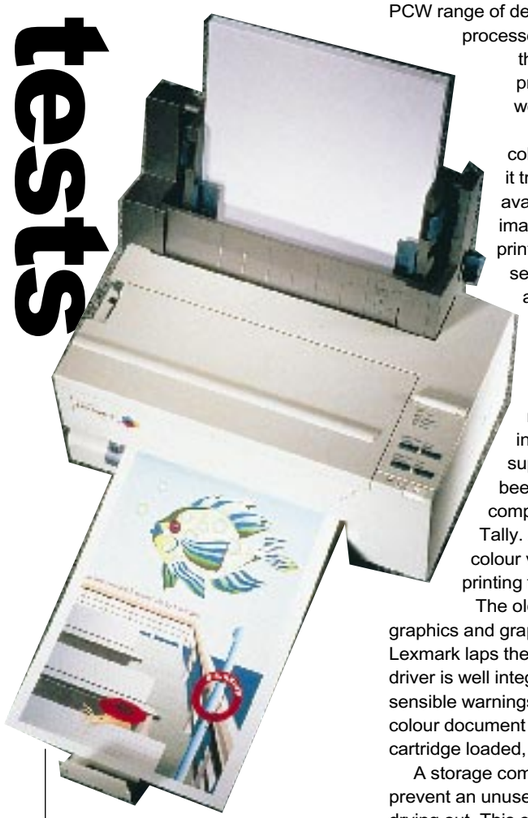
A storage compartment is supplied to prevent an unused ink cartridge from drying out. This clips on to the left side of the printer but causes an increase in the printer footprint, a problem which could have been avoided had it been designed to be mounted on the right. It would have been nice not to have had to change cartridges to and from colour: the ink cartridge does have a tendency to dry out if left unused for a while in the printer. A purge cycle usually restores good operation, although it sometimes requires a manual clean-out.

As for print quality, even when using high-grade paper, character edges look slightly "splattered". Colour results are pleasant but cheap paper can be a problem, as "soaking" causes the paper to ripple in the areas of dense colour. The sheet feeder needs help to cope with card but the printed result is actually better than with white copier-grade paper. The Lexmark also deals successfully with envelopes and cheques, but these require careful loading to ensure a straight print.

I like being able to load single sheets of paper at the front without first having to remove the paper in the rear sheet feeder. In this case, I find it best when loading paper, cheques or envelopes, to operate the lever which disables the rear sheet feeder, otherwise it tends to grab a sheet from the feeder as well.

Apart from the rickety output paper tray, the construction quality is good and I haven't yet broken anything. I yearn for a traditional on/off switch, since the printer is always in standby mode when I apply mains power: at switch-on, it messes about for ages before being ready to use.

Colin McCormick



The Lexmark gives great graphics, even if there is a lot of smudging

PCW Verdict

Good Points Adaptable.
Bad Points Some smudging on cheap paper.
Conclusion Reliable.

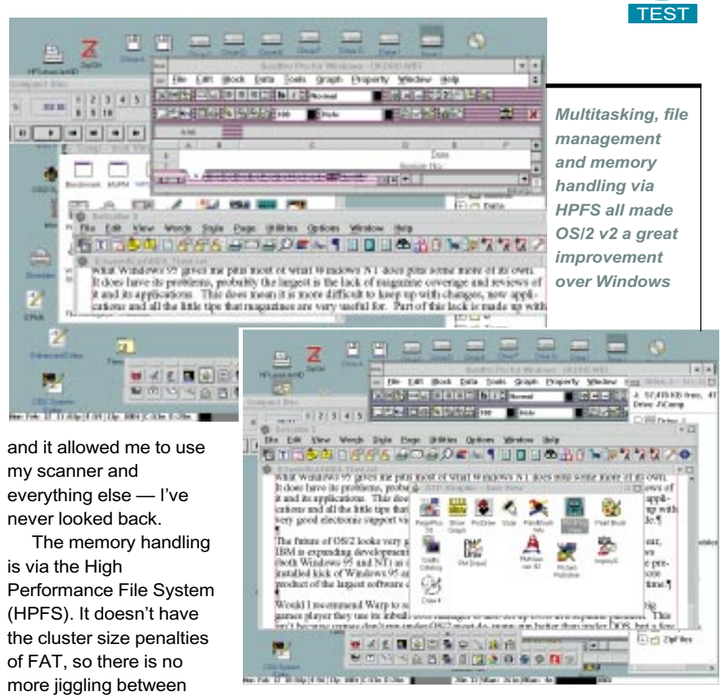
Price Current equivalent: Lexmark ColourJet Printer 1020, £220 (plus VAT)
Contact Lexmark 01628 481500; Technical Services 01923 208484

SOFTWARE

OS/2

3 YEAR TEST

Although appearing to be heavily configured and intimidating, OS/2's adaptability offers huge bonuses in file management.



Multitasking, file management and memory handling via HPFS all made OS/2 v2 a great improvement over Windows

I FIRST STARTED ON COMPUTERS with a used CP/M machine, then moved on to an IBM-compatible computer with DOS. I added Windows 3.0 and DesqView with QEMM for better task and memory handling and upgraded to Windows 3.1. Then I discovered OS/2, and have been using it and its upgrades for more than three years, in my antique woodworking tools business.

One of the first questions to ask is what hardware OS/2 needs. When first reviewed it was slated for needing at least a 386 and 8Mb of RAM. It will run reasonably well on this but more RAM will speed up most tasks and 12Mb is a sensible minimum. My hardware is a cobbled-together system: an old ISA-bus 486SX with 16Mb of RAM and parts from an earlier 386. I have an external CD, a hand scanner and a modem.

All versions of OS/2, from 2.0 to Warp, have installed on my non-standard machine without problems. Installing the right drivers for your video card can be a problem but this applies equally to other operating systems.

My initial reasons for trying OS/2 stemmed from using a DOS-based hand scanner and from answering the phone, which may sound silly so I'll explain. I use the scanner to copy outlines of wooden moulding planes from a catalogue, but it will not run under Windows. The telephone is an issue as I often have to quickly look something up in a word-processed document or a database while a customer is waiting, hence the need for multitasking. Before turning to OS/2 I was running Windows under DesqView. The combination worked and gave me better control over my work, but was tedious all the same.

My first thoughts were to keep upgrading DesqView in the hope that Windows would become more stable and better at multitasking with newer releases. Instead, I became impatient and upgraded to OS/2. This was version 2.0 and it allowed me to use my scanner and everything else — I've never looked back.

The memory handling is via the High Performance File System (HPFS). It doesn't have the cluster size penalties of FAT, so there is no more jiggling between extended and expanded memory and I gained disk space on a larger drive. HPFS even has automatic bad track recovery, which saved me when my hard disk became corrupted.

One criticism often laid on OS/2 is its lack of native applications. Mine were either DOS or Windows apps and all ran without problems, except parts of PC Tools which had direct hardware access. Again, OS/2 was criticised for not allowing direct hardware access, yet this is now considered a good thing under Windows NT.

The number of native applications is reasonable but they are less well known. It runs most Windows 95 and almost all Window 3.1 applications. There are a few applications that will specify a particular operating system and if you cannot live without that package, then your choice of operating system is limited. At least OS/2 is customer friendly — its boot manager will let you boot in to other operating systems with ease.

OS/2 can be heavily configured, which can seem rather intimidating to begin with. However, most of the changes you can make are hidden below the surface so initially I left most of it alone. With experience, and necessity, the configuration options are easily unravelled and the adaptability it offers is a huge bonus.

Some may ask "Why not change to Windows 95?" My answer is: because Warp is solid and it gives me all that Windows 95 does, most of what Windows NT does, and some more of its own besides. The lack of magazine coverage given to it results in it being more difficult to keep up with changes, new applications and all the little tips for which magazines are very useful, but good electronic support is available via CompuServe and the Internet. I would suggest you set up a separate partition for DOS and use OS/2's built-in boot manager to access this. Games will run under OS/2, but not as well as they will under DOS.

Charles Stirling

PCW Verdict

Good Points Solid, reliable, adaptable.
Bad Points Games run better under DOS.
Conclusion Excellent file management.

Price From £65 (plus VAT)
Contact IBM 01329 242728

PCW Illustration by Andy *Parker*

PCW Awards 1996

The gongs have been polished, the champagne is chilling in the icebox, the votes are in and counted. Now we can reveal the PC players of the year. Once again you've had your say, and for the last few months the *PCW* office has had to make room for the sackfuls of nominations.

While we sit in judgment over the latest hardware and software, it is you, the readers, who actually go out and buy the stuff and have to live with it. That's why your opinion is important, and we are delighted that so many of you responded to our call to vote in the Readers Awards section.

To keep pace with computing developments, a number of new award categories have been introduced this year. Reflecting the growing importance of the Web we now have a Best UK Web Site Award and Best Web Site By A Small Company. Who knows, next year we may have a category for best Network Computer. Meanwhile, the Most Innovative Software and Most Innovative Hardware sections reflect a year where real advances have been made.

Changes elsewhere mirror the growing sophistication of key peripherals which are now broken down into categories; sound cards, CD-ROM drives and graphics cards are all now judged individually.

As more PCs are bought for the home and become multimedia devices, so we felt the need for a category of Best PC For The Home.

In the Readers Awards we have split Best Telephone Support into software and hardware categories to take account of the difference in each area's requirements.

And you certainly responded well to our new Best Advertisement category, which proves that people do notice PC advertising. Those vendors who still think the best way to sell kit is with a picture of a woman with no kit on, should maybe think again.

Once again, we are the only PC magazine that gives its readers a voice, and we know the industry cares what you think. So sit back and find out who's won.

● *Please note that all prices quoted in this feature are street prices and exclude VAT except where otherwise stated.*

AWARDS '96

Personal Computer World

PCW Awards CONTENTS

Readers Awards

For the second year running we opened the *PCW* annual awards to our readers and the response was phenomenal. The Readers Survey forms have been processed and the results assessed by our resident Cray Supercomputer. Now the winners can be officially revealed.

The *PCW* Awards are not just about great products: they're about service as well. The most innovative product in the world is nothing if it breaks down after two weeks and the service department hasn't been set up yet. And being put on hold for two hours is no-one's idea of a good time.

To really judge the market this year we split up the Telephone Support awards into Hardware and Software categories to monitor support in these fundamentally different areas. That's why the service awards you see on this page are entirely judged by *PCW*'s readers because only you can be the real arbiters of service and support where it matters, in the market.

So may we congratulate this year's champions in the *PCW* Readers Awards for 1996, for Best Software Vendor, Best Hardware Vendor, Best Telephone Support, Best After Sales Service, Most Reliable PC and Best Advertisement.

Gateway hit the spot as the No 1 hardware vendor while its advertising campaign was your favourite by a mile

How you voted

● Best Software Vendor (or Dealer)
1 Software Warehouse
2 Microsoft
3 Technomatic
4 PC World

● Best Hardware Vendor (or Dealer)
1 Gateway 2000
2 Dan
3 Dell
4 Simply Computers

● Best Telephone Support
1 Dan
2 Gateway 2000
3 Dell
4 Evesham Micros

● Best Telephone Support - Software
1 Microsoft
2 Software Warehouse
3 Borland
4 Serif

● Best After Sales Service
1 Dan
2 Gateway 2000
3 Dell
4 Evesham Micros

● Most Reliable PC
1 Dan
2 Dell
3 Gateway
4 Compaq

● Best Advertisement NEW
1 Gateway
2 Dell
3 Dan
4 Software Warehouse

PCW 1996 Awards Nominations: *Winner*

Up for grabs this year was a Dan Ultimate 133MHz Pentium PC. And ultimate seems to be the right word, with 16Mb of RAM, 1Gb hard disk, 2Mb of VRAM, quad-speed CD-ROM drive and a SoundBlaster AWE-32 sound card. And to complete the picture, a high-res 17in monitor. A suite of Microsoft software is pre-installed to get you going fast.

● ***The winner is: BS Duncan, of Verwood, Dorset.***

Most Innovative **Hardware**

1 Iomega Zip drive; *£149 (street price)*
2 Cyrix 6x86; *from £99 to £269**
2 IBM Thinkpad; *£1,575*
2 Panasonic PD; *£489 (street price)*

Is that a gigabyte in your pocket? At 100Mb each, the disks for the Iomega Zip 100 drive far outstrip the capacity of a standard floppy. It seems to have become the rewriteable format of choice since the 2.88Mb floppy failed. Good software support, partly thanks to the Mac's understanding of all things SCSI and Windows 95 plug-and-play, means that setting up a Zip drive is easy. Transfer rates are disappointing when compared to a hard disk but ultimately it's a great backup medium: tapes might be cheaper per megabyte but are awkward to use if you just want one file out of a backup. IBM invented floppy disks as a way of getting data from a machine where it was inputted to a machine where it could be processed, and the Zip drive is ideal for this.

The biggest problem you might have is finding a dealer with a Zip drive in

stock. The Zip's success has sent Iomega's share price rocketing, and its 1Gb Jaz drive has just been announced.

First runner-up is the Cyrix 6x86. Both Intel and Cyrix set out to produce a chip which was better than the Pentium. Cyrix succeeded, Intel failed. Cyrix went with a chip which was a little better; Intel was too ambitious. In the right circumstances a Pentium Pro can run rings around a Pentium or a 6x86, but those circumstances don't include day-to-day use of Windows or Windows 95. Even at its slower clock speeds the Cyrix 6x86 is faster than the Pentium, thanks to better design of the pipeline, making it the quickest thing on pins around at the moment.

It's the spring in the keyboard which puts a spring in the step of an IBM Thinkpad user and makes the Thinkpad Butterfly second runner-up. Clever mechanical design means that the keyboard pops out to give a sensible typing area despite the Lilliputian dimensions of the machine. Sadly, the Butterfly was not a big commercial success and has now been discontinued. But the whole Thinkpad range, including the many models with conventional keyboards, reflect the re-birth of IBM. No longer able to trade on its name, the company has resorted to producing some great products.

Last but not least is the Panasonic PD Drive. It works as a conventional quad-speed CD drive but, with Panasonic's PD disks, becomes a drive which can write in its own format to store up to 650Mb on a forty-quid cartridge. A storage watershed.

* *Manufacturer's bulk purchase cost*

Best **PC System**

1 Gateway P5-166 Sovereign; *£2,099*
2 Vale Platinum SE P150; *£1,844*
3 Armari eXPS-100; *£1,824*
4 Dan Dantium 95/s 120MM; *£1,444*

New processors have been coming at us thick and fast this year, knocking the slower chips out of the way. In the new year Intel released the Pentium 150 and Pentium 166 processors, and the Pentium Pro appeared at the end of '95. The DX2/66, while still available from some sources, has for the most part been consigned to history. Intel is promising a 200MHz Pentium soon, while Cyrix has taken them on with the 6x68.

To match this increase in processor power, memory prices have been falling fast. More machines are bundled with 16Mb of RAM as standard and much larger hard disks, some up to 2.5Gb. Most manufacturers have swapped from FPM RAM to EDO RAM and from standard L2 cache to pipeline burst cache.

The winners we have chosen in this category have won their various group tests this year. In choosing the best

machines we look for the best price and performance, but we also take into account such factors as the overall specifications, software bundle and warranty deal.

A special mention goes to Dan for its Dantium 95/s 120MM. It won our P120 group test, not because it was the fastest or the cheapest, but because it was the best all-round machine for the price.

Armari wins the third prize. The system the company put into the P100 group test was the best-specced machine was saw all year. For a price close to many of the other PCs in the test, Armari managed to cram in a CD changer and a tape backup unit: both extremely useful pieces of equipment.

The runner-up prize goes to Evesham Micros for its excellent Vale Platinum SE P150. With a 2Gb hard disk, TEAC six-speed CD-ROM drive and Matrox Millenium video card with 2Mb of WRAM, it fair trashed the opposition and was offered at a decent price.

But Gateway wins the Best PC System award for its P5-166 Sovereign. It is very fast and well specced, and if you are looking for a P166, it is one of the best all-round and best value machines on the market.

Best **PC for the home**

1 Apricot MS530 Diamondtron 17; *£2,799 (inc VAT)*
2 Compaq Presario 5520; *£1,531*
3 Apple Performa 5200; *£1,275*
4 Dell Dimension XPS P100t; *£1,459*

The selection for the Best Home PC was one of the toughest choices we had to make. Reader response was overwhelming in volume but incredibly varied in votes, showing that everyone had their favourite. After much hand-wringing and debate, the judges managed to whittle the field down to one winner and three runners-up, all perfect examples of a multimedia home PC.

The Dell Dimension XPS P100t came in fourth. It was the only desktop PC from a direct seller to make the cut, but with its Pentium 100MHz power and high-spec subsystem it's not an unusual choice. What *is* unusual is our third-place home PC, the Apple Mac Performa 5200. It seems that the judges just can't ignore the virtues of a true plug-and-play PC. Coming in second, with lots of popular support, is the Compaq Presario 5520.

Compaq seemed to be the one that started the craze for the all-in-one multimedia home PC, and the Presario 5520 with an Intel Pentium 75MHz chip was the company's first entry-level Pentium-based machine. With its excellent build and strong software bundle, it's not surprising it was a hit among readers.

The winner of the Best Home PC award for 1996 is Apricot's MS530 Diamondtron 17. It classifies as a truly outstanding all-in-one multimedia home PC that combines Pentium power with point-and-click simplicity. The MS530 can be a games centre for the kids, an office suite for Dad, or a TV for the whole family.

The MS530 is based around a Pentium 120, 133 or 166MHz CPU. Its standard features include full 16-bit sound capability, on-board graphics with 1Mb of VRAM, 1.7Gb Quantum hard disk, quad-speed CD-ROM, integrated speakers with audio enhancement, V.32bis fax/data/voice modem, and a Teletext TV tuner with 122 channels. Remarkably, all of these features are accessible via an infra-red remote control, including the mouse pointer, and are fully integrated into Apricot's Media Manager and message centre. It allows a family to leave messages for each other, receive email, watch TV, play games and more. The MS530, with all its features, is a most worthy choice for this award.

Best **Notebook**

1 IBM Thinkpad; *from £1,920*
2 Dell Latitude; from *£1,700*
3 Toshiba Satellite Pro; *from £2,100*
4 Gateway Solo; *from £2,349*

IBM had several miserable stabs at portable computing in the eighties, first with the IBM Portable, then with the Convertible and finally with the P70 386; all dismal, weighty machines that more or less sank without trace. Big Blue had to wait until the nineties for its first decent portable computer. Since their launch in early '94 the Thinkpad notebooks have done very well, regularly leading the market in innovation, design and specification.

Innovations include the much copied eraserhead pointing devices and the Thinkpad Butterfly's ingenious collapsible keyboard. For design, look no further than the stylish black casings, the emphasis on modularity and the excellent keyboards. Specification — you want built-in multimedia, a big hard disk, a fast processor and a large TFT colour screen? You'll find it all in the IBM Thinkpad 760CD.

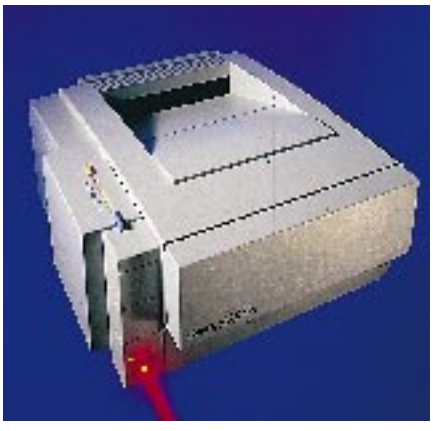
Usually the only thing which puts prospective buyers off Thinkpads is the price. The close-to £6,000 price tag of a top-of-the-range multimedia Thinkpad just squeezed it out of the frame in our March '96 group test, but *PCW* readers' votes left us with no choice but to choose the IBM Thinkpad as our best notebook for 1996.

Runner-up was the Dell Latitude. Funnily enough, Dell had as many problems with its early notebooks as IBM with its portables, but the Latitude range has confounded the critics. Two *PCW* staffers use them all the time and have no complaints. They're designed by Dell but built by Sony, whose credentials in snazzy electronics need no introduction. Latitudes are known for particularly good battery life, thanks to Lithium Ion batteries, but also offer good build quality and great screens. And prices, while not cheap, are at least affordable.

Consolation prizes go to the Toshiba Satellite Pro and the Gateway Solo. Toshiba, which makes no desktop PCs, still dominates the notebook market and looking at the Satellite Pro it's not hard to see why. Finally, Gateway, Dell's arch rival, has a decent product with its latest Solo notebook. It's nicely designed and competitively priced.

Best **Printer**

1 HP LaserJet 5P; *£585*
2 Panasonic KX-P6100; *£265*
3 NEC Superscript 610; *£255*
4 Tektronix Phaser 140; *£1,150*



This year we've looked at all kinds of printer, from the chest-freezer sized Xerox 4700II to tiny portable printers like the Citizen PN60. In such a diverse market it's difficult to single one out as "the best", so here we've given a special mention to printers from different market segments.

One of the most memorable from August 95's round-up of colour printers is the Tektronix Phaser 140, which earns itself fourth place in this year's awards. The Phaser 140 is a four-colour inkjet with each colour stored in a separate cartridge so that you only ever need to replace the colour which runs out. As well as coming with PostScript Level 2 and producing stunning colour output, the Phaser 140 also has Parallel, LocalTalk and optional Ethernet, TCP/IP, and NetWare ports.

Cheap laser printers have also made their mark this year as manufacturers have found new and inventive ways of cutting costs. NEC's Superscript 610 was one of the first GDI printers on the market, offering great 600dpi text and a print speed of 6ppm. GDI technology cuts down the production cost of laser printers by using Windows' own description of the desktop to drive the printer. Panasonic's KX-P6100 uses the same GDI technology but with an unusual upright design which gives it a tiny footprint. Both printers have PCL Level 4.5 in reserve, and both have a street price of around £300. They get 3rd and 2nd place respectively in our Best Printer category.

The overall winner in the Best Printer category goes to the HP LaserJet 5P, a large 6ppm printer which comes with PCL 5e and 2Mb of RAM as standard. The feature which really gives this printer the edge is its IRDA-compliant infra-red port which allows you to print from your notebook, pocket computer or even the address book in your mobile phone. Options for the 5P include Ethernet and PostScript with a Macintosh interface (this latter is marketed as the 5MP). HP's resolution enhancement technology puts the 5P head and shoulders above the other lasers in our November round-up, producing excellent results in our quality tests with its pristine 600dpi text.

Best **Budget Printer**

1 Canon BJC210; *£170*
2 Sharp JX9210; *£319*
3 Lexmark Winwriter 150c; *£255*
4 Epson Stylus Colour II; *£251*

Over the past few years both inkjet and laser technologies have been steadily refined to produce a more and more polished output at a cheaper and cheaper price. And in a continually changing market, competition between printer manufacturers is always fierce, particularly at the budget end.

The monochrome inkjet appears to have disappeared altogether now, with new colour models dominating the home user market. In *PCW*'s last group test of colour printers it was the Epson Stylus Colour II which we found particularly impressive. Epson was the first manufacturer to introduce piezo electric technology to the inkjet printer, which offers a much improved speed and output quality over conventional inkjets. This is combined with Epson's "microweave" technology which virtually eliminates the banding effect common in inkjet printers.

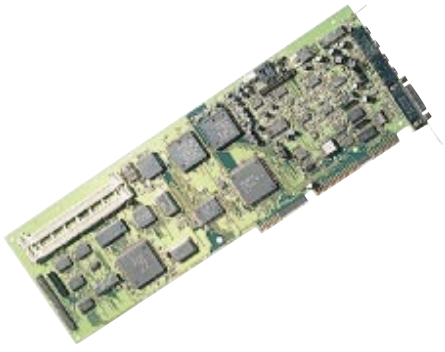
A special mention must go to the Lexmark Winwriter 150c which earned itself Editor's Choice in our August round-up. Using the Windows Printing system, the 150c scored exceptionally well in our performance tests as well as producing stunning-quality colour and mono output. Like Epson's Stylus Colour II the 150c holds two cartridges, one for colour and one for black ink, so you can switch between colour and black text in the same document.

In the cheap laser printer category, it's still the GDI printer with its simplified design which offers the best value for money. The most impressive we've seen is the Sharp JX-9210, a compact laser printer with a footprint of just 11.8in x 11.9in and superb 600dpi text output.

For most people though, it's the inkjet which provides real versatility and value for money, which is why our Best Budget Printer award goes to Canon's new BJC210. Despite its three colour cartridge design, the 210 produces the best composite black we've seen to date. From the mono cartridge black text output is crisp and clear even on plain copier paper, and we found the quality of colour documents from such a small printer to be exceptionally good. You can get hold of the BJC210 for a street price of about £170 or less.

Best **Sound Card**

1 Creative Labs SoundBlaster AWE-32; *£150*
2 Orchid Nusound; *£99*
3 Aztech Soundgalaxy Waverider Pro 32 3D; *£79*
4 Turtle Beach TBS 2000; *£145*



The popularity of multimedia over the last few years has accelerated the development of the sound card, and the fierce competition between manufacturers has followed its usual pattern, resulting in more sophisticated technology at lower prices. Wavetable has made a massive improvement to the quality of sound when compared to the synthesised sounds of a few years ago, as has DSP (Digital Signal Processing) which allows reverb, delay, and other digital effects to be applied to instruments or samples.

This year we've seen a whole range of new sound cards with the first "plug and play" offerings finding their way into our testing labs. Particularly impressive in our April group test was the Turtle Beach TBS-2000, one of the first genuine plug-and-play cards. It comes with 2Mb of general MIDI-compatible wavetable samples and produced excellent results in our tests, earning it fourth place in this year's best sound card category.

Third in line is Aztech's Soundgalaxy Waverider Pro, a cheap all-round multimedia card with a leaning towards the games market. The Waverider comes with a 1Mb Wavetable synth containing reasonable on-board sounds, plus 3D sound effects for sprucing up your video games and movie soundtracks. With a pair of headphones included and a healthy bunch of bundled applications, the Waverider offers a great deal for just £79.

At the higher end and earning second place in the sound-card category is the Orchid Nusound, which comes with an amazing 343 samples compressed into 1Mb of WaveTable ROM. Installation under Windows 95 went smoothly. Under test, it produced low noise levels and high sampling rates, making it suitable for some of the more high-end audio applications. And with great expansion capability, Orchid's Nusound is one of the more versatile high-end cards around.

The best sound card award for this year goes, not surprisingly, to Creative Labs' AWE-32, another of the first few plug-and-play sound cards on the market and winner of Editor's Choice in our last group test. It has 512Kb of sampling memory which is expandable to 28Mb using the 30-pin SIMM bank, as well as a feature connector for adding a Wavetable daughterboard.

Despite its higher than average price, the AWE-32 is undoubtedly one of the most flexible and compatible cards we've seen in the past year.

Best **CD-ROM Drive**

1 Teac CD-56e; *£95*
2 Plextor 6PLEX; *£225*
3 Aztech 6 Speed; *£69*
4 Toshiba 3701B; *£249*

CD-ROM drives are speeding up and dropping in price faster than almost any other computer peripheral. The days of expensive single-speed drives is only a distant memory in terms of price and performance. Double-speeds set the standard after single, to be replaced later by quads, which are now all but superseded by six-speeds. While our awards are concerned with six-speed drives, eights are becoming common on new systems, and already several manufacturers have announced 10-speeds.

Our first runner-up award goes to Aztech for its ATAPI six-speed drive, which cost less than most people's quads when first released. ATAPI CD-ROM drives which can be fitted to an Enhanced IDE controller are so common these days that you'd be forgiven for forgetting about SCSI drives. Last year, the two SCSI drives that particularly impressed were Plextor's 6PLEX and Toshiba's 3701B.

As CD-ROM drives spin faster and transfer more information, a greater strain is placed on the processor. Drivers can do a certain amount to relieve this, and Plextor, first out with a six-speed drive of any variety, came up with the software to deliver the goods. Coming as standard with all Plextor's CD-ROM drives, these excellent drivers considerably reduce the load. The 6PLEX earned Editor's Choice for SCSI CD-ROM drives last year.

Earning Highly Commended in last year's CD-ROM drive group test and a runner-up award here is Toshiba's super-fast 3701B SCSI drive. Where most manufacturers stopped at six-speed, Toshiba stretched out to a genuine 6.7, comfortably beating all in terms of performance.

The marketing material claims six-speed, but many drives fell short in our tests: most six-speed CD-ROM drives delivered a somewhat lower 4.5 to 5 speed performance. Perhaps one shouldn't grumble, considering the low prices, but Teac thought differently. Its ATAPI CD-56e, fitted to many PCs, won Editor's Choice last year and earns itself the *PCW* award for Best CD-ROM Drive thanks to a rock-bottom price tag and genuine six-speed performance.

Best **Modem**

1 Motorola 3400; *£169*
2 US Robotics Sportster; *£199*
3 Linnet 34 fx; *£199*
4 Hayes Optima 288 V34; *£315*

Our top modem, the Motorola 3400, won the Editor's Choice award in our February group test and supports the V.34 standard for 28.8Kb/sec connections; the fastest officially available.

This was Motorola's first mass-market modem after years of supplying high-end models, and won acclaim for robust connections and security features such as password-enabled callback.

The 3400 comes in a smart beige case, with an array of status lights and, confusingly, two names: the Online and the Pro, differing only in the bundled software. Both include an idiot-proof setup routine but the Online also packs a suite of Internet software, a couple of games and an IBM network trial.

Motorola says it is about to drop prices on both. The Pro can be bought for about £169; the Online, sold in a bundle called

"Internet Solution, is £10 more. Service providers are more or less giving away Internet software at the moment, so the Pro is marginally the better bet.

The modem market has just been thrown into confusion by a decision by major Internet provider, Pipex, to support an unofficial extension to V.34, allowing connections at up to 33.6Kb/ses (see *Newsprint*). This is expected to be incorporated into the official V.34 this October, but the latest model of the US Robotics Sportster, one of our three runners-up, has jumped the gun on the revised standard and already supports 33.6Kb/sec.

This kind of pre-emptive action is risky as there is no way of testing the modem with non-USR implementations. The Sportster would need a ROM swap if its configuration turns out to need a tweak.

Another runner-up is the Linnet 34 fx, from the UK firm, Pace. Like the Sportster it lists at £199 (excl VAT) but can be bought for less than £160.

Our final runner-up, the Hayes Optima 288 V34, is more expensive at £315 street price (excl VAT) but is designed for critical business tasks. Hayes, Pace and Motorola are all waiting for a 33.6Kb/sec standard to be agreed before implementing it.

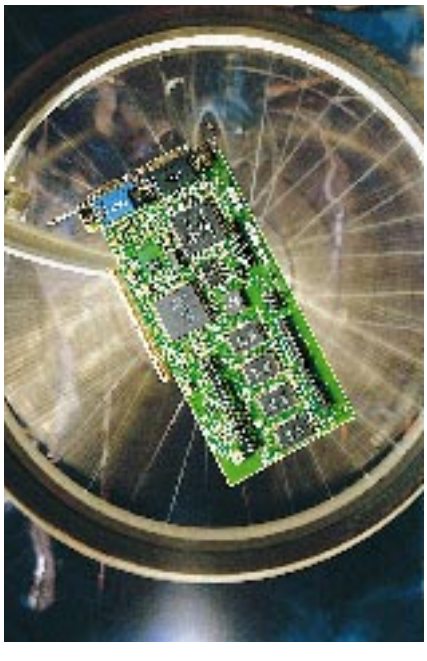
Best **Graphics Card**

1 Matrox Millennium; *£215*
2 ATI Video Xpression; *£130*
3 VideoLogic GrafixStar 700; *from £249*
4 Diamond Stealth 64 Video 3400XL; *£200*

Having conducted a group test of graphics cards in our May issue, choosing a winner for the Best Graphics Card category should have been a piece of cake. The product awarded Editor's Choice in that issue is obviously the one that gets this years' annual award, right?

Not quite. Our annual awards look at the merits of products past and present, and your input counts for a lot as well. So the best graphics card is more likely to be a popular, high-performance model that's already proving itself in PCs, rather than just the one that scored the highest in our most recent tests.

This year, an honourable mention goes to Diamond for the Stealth 64 Video 3400XL, and Videologic GrafixStar 700



steals third place. Both are good all-round devices that speed up Windows and improve the playback of Video for Windows AVI files. Ideal for upgraders everywhere.

The runner-up in the graphics card category is the new ATI Video Xpression, which came tops in our recent survey. A great performer, this new card looks set to be big in the future, and with a street price of around £130 (RRP £175) it certainly has a head start, and is one to watch.

After much debate, this year's winner of the Best Graphics Card award is the tried and tested Matrox Millennium. Available in 2Mb, 4Mb and 8Mb WRAM configurations, it's a well-made product that's become increasingly popular over the last year. Many manufacturers offer it as an option with their PCs, and in software tests it has proved to be one of the most compatible and well-supported cards on the market.

Other notable features on the Millenium include an 85Hz refresh rate in nearly all modes and support for 3D graphics, with hardware accelerated gourad shading and Z-buffering. There's even a version that works on the new PCI Macs. Top marks.

Best **Gadget**

1 Psion 3a; *from £269 (incl VAT)*
2 Visioneer PaperPort VX Scanner; *£229 (RRP)*
3 Gyrations Gyrapoint; *£119*
4 Logitech Trackman Marble; *£60*

When a Psion 3a alarm goes off in the *PCW* office a gaggle of writers look for their ESC key. It's become the *de-facto* personal organiser, which isn't bad for something which has seen off pretenders from Apple, Hewlett-Packard, Sharp and Casio over several years.

What makes the Psion 3a so great isn't its 60 hours from a set of batteries, or its 640 x 400 LCD screen. It certainly isn't its 8086-based CPU. What makes the 3a special is its software. This starts with the custom multitasking operating system (you really do need to get from the spreadsheet to the diary to the address book instantly if you are looking up things while making an appointment), to the applications and the programming language. You might not want to program your Psion but the standard tools have led to a profusion of third-party programs. At the price, it's a cheap way to make yourself considerably more productive.

Document scanners have proliferated in the last year, led by runner-up, the Visioneer PaperPort VX Scanner. Teach your computer to read. The PaperPort sucks in documents and turns them into proper formatted files ready for use in over 100 applications. Automatic OCR launches when you drag a thumbnail into a document. In our tests. the results with pictures were disappointing, but as a cheap way of getting documents into your computer without occupying loads of desk space, it's great.

Also innovative is the Gyrations Gyrapoint, a pointing device which doesn't need to be kept flat on a desk. The clue is in the name — the Gyration GyraPoint has a tiny gyroscope hidden inside. A wireless version makes it great for presentations. This is a technology you won't be able to put down.

Finally, the Logitech Trackman Marble. The quest is no longer for a better mousetrap but for a better mouse. Logitech has improved on the pointing technology with a system called "marble sensing". This uses a sensor to track the movement of patterns of dots printed on an inner layer of the ball, itself protected from wear by a special coating. The result is a trackball which works much more accurately and laughs in the face of dirt and dust.

Most **Innovative Software**

1 Microsoft Windows 95; *£59 (upgrade)*
2 Borland Delphi; *£400*
3 Netscape Navigator 2.0; *£59.95*
4 Macromedia Shockwave; *Free download*

Maybe we've all got used to the Internet since last year when three of the awards in this category went to Internet-related software. After all, it is difficult not to be affected by the biggest product launch in the history of computing. For those PC users who have taken the plunge, Windows 95 has been a revelation. Few who have tried it would want to go back to Windows 3.1.1.

Windows 95 has brought an easy-to-use, multitasking operating system to millions. Add a plug-and-play system that works, Internet and networking integration, long filenames and Shortcuts, and you have a Microsoft OS that makes a PC fun to use. It still crashes and needs 16Mb of RAM to make it fly, but there is no doubt it's an advance and far better than many dared believe.

Of course, Mac users like to point out that they have had these tools for years, and that's true, but the real difference is 95 percent market share. And that's why Windows 95 is important. Worryingly for Microsoft's competitors, it can only get better.

Elsewhere, Borland's Delphi has come from nowhere to take 12 percent of its market — and deservedly so. Tim Anderson described it as "Borland's best product for years". It's not better than Visual Basic, overall, which remains the product of choice for database and cross-application development. But Delphi's built-in compiler and ease of use has made it a first choice RAD (Rapid Application Development) tool for corporate developers.

The Internet is still driving software development and for the second year Netscape's Navigator is in contention, as version 2.0 maintains its position as the world's best Web browser.

The Web is changing rapidly and, increasingly, innovation in the Internet is coming from third parties eager to extend the limits of Web browsing. MacroMedia's ShockWave plug-in for Navigator 2.0 is just such a product. It brought real multimedia to Web sites with download times on a par with the average graphic. While everyone talked about the promise of Java, Shockwave actually delivered.

Best **Business Software Application**

1 Word for Windows; *£229*
2 Excel; *£229*
3 Lotus Notes 4; *from £125*
4 Quicken; *from £26*

Last year's finalists for the Best Business Software Application award were Intuit, Lotus and Microsoft. QuickBooks grabbed first prize, Lotus 1-2-3 came in second and Powerpoint brought up the rear in third place. Oddly enough, this year the same finalists are lining up again in a different order with different products.

Intuit receives an honourable mention for its easy-to-use accounting program, Quicken. A remarkable little application, Quicken makes home and small business account handling understandable — fun even. If you need to balance your budgets we recommend you take a look at this.

In reverse order, third place goes to Lotus for its ground-breaking groupware, Lotus Notes. Notes provides all the facilities needed to get people working together more efficiently, and version 4.0 is the best yet. Its features include excellent shared information databases, email facilities, and the ability to set up conferences where users can share ideas and talk to each other even though they may be several offices apart. We're even implementing Notes, here at VNU.

That leaves Microsoft with second place, and this year it runs off with first prize as well. The former goes to Excel, the best spreadsheet on the market and the standard by which others are judged. The new Windows 95 release is easier to use than ever before, with features such as the Answer Wizard online help system, improved drag-and-drop editing and AutoCorrect. Here at *PCW* we use it to help plan our issues and manage our budgets.

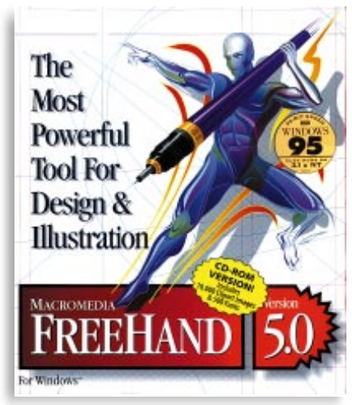
The winner of Best Software Application 1996 is Microsoft Word. By far the most widely-used product in the *PCW* office, and a huge favourite with our readers, Word keeps going from strength to strength. As with Excel it's now easier to use than ever before, with the ability to automatically correct words, change symbols and format documents as you type. It integrates seamlessly with other parts of Office, via OLE, and can be used to edit HTML pages with the additional Microsoft's Internet Assistant. There simply is no better word processor for the PC.

Best **Creative Software**

1 Macromedia FreeHand 5; *£450*
2 Macromedia Director; *£995*
3 Photoshop version 3; *£540*
4 CorelDraw 6; *£495*

The applications which really impress in this fiercely competitive environment are extremely capable products. All four selected here deserve the title of Best Creative Software but there can only be one winner.

Runners-up include Macromedia Director, ubiquitous in multimedia authoring. Everyone's old favourite, Adobe Photoshop, remains an invaluable tool for any kind of image manipulation. The latest version 3 now boasts layers, while Plug-ins, which allow third parties to expand and enhance the product, are a firmly established standard. Almost all bitmap paint and photo-retouching applications are compatible. One such is Corel PhotoPaint, available as a separate product but still also part of the all-encompassing CorelDraw graphics suite.



CorelDraw 6 is, deservedly, our third runner-up for Best Creative Software.

The Canadian package always represented great value with its number of bundled modules, but lacked consistency between them. As time went on Corel unified the interface.

CorelDraw 6 is the latest chapter in the story, offering all the familiar elements, stacks of fonts and clipart, and a few new ones, including a 3D module.

However, what CorelDraw boasts in value and sheer size, it often loses in usability. This is where our winner steps in: Macromedia FreeHand 5 is simply the greatest drawing application around. FreeHand is developed by Altsys, which used to license the product to Aldus. Adobe Illustrator and Aldus FreeHand fought it out on the Macintosh platform for years before making it onto Windows. Shortly afterwards Adobe and Aldus merged, forcing the company to drop one of them. FreeHand returned to Altsys, which recently licensed it to Macromedia in time for version 5.

While Adobe neglected Illustrator for Windows, Altsys and Macromedia ploughed on, releasing new versions across platforms shortly after each other. The result is a superb and well-supported product which is leaps and bounds ahead of the competition.

Best **Suite**

1 Microsoft Office Pro 95; *£425*
2 Lotus SmartSuite 96; *£129*
3 Novell Perfect Office 3.0; *n/a*
4 CorelDraw v6: *£275*

Microsoft Office is the software used by the *PCW* editorial team and has between 80 and 90 percent of the suite market depending on whose figures you look at. Microsoft Office polled just over four times as many votes as second-placed Lotus SmartSuite ,making it the resounding winner of our Best Suite category. Each of the component applications, Word, Excel, Powerpoint and Access, are outstanding in their own right and would probably win most of the individual categories if we still had awards for word processors, spreadsheets presentation packages and databases.

Microsoft pioneered the concept of the software suite. At first it was little more than a marketing device and consisted of putting three very different products, Word, Excel and Powerpoint, into the same box. Since then Microsoft has worked hard to integrate them by making the interfaces more alike. It has also added a host of new features, notably the much hyped, copied and, dare we say it, useful intellisense which spell-checks on the fly and tidies up typing errors, and Microsoft Access, an optional but powerful database.

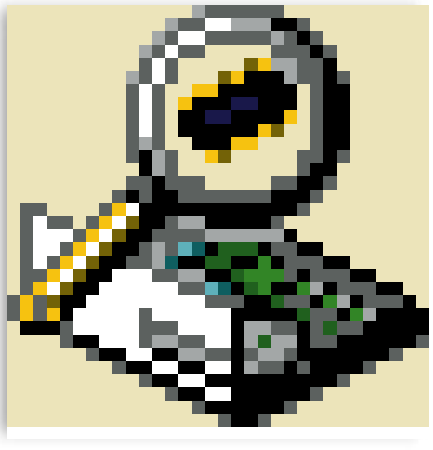
Microsoft has also made efforts to make the components work better together by introducing features like MOM (Microsoft Office Manager) and the Office Binder which lets you create a single file containing a mixture of different types of documents such as worksheets and letters. What it still hasn't managed to do is reduce the huge memory and disk requirements of its increasingly monolithic applications.

Runner-up, Lotus SmartSuite, consists of Lotus 1-2-3, WordPro (formerly AmiPro), the Freelance presentation package and Lotus Approach with the added bonus of the Organizer PIM. SmartSuite matches Office for functionality and has some loyal fans, but doesn't achieve Office's level of integration. Still, Lotus has an ace up its sleeve in the shape of the Notes application components due for launch this summer.

Our two remaining runners-up, in no particular order, are CorelDraw v6 and Novell Perfect Office 3.0. Ironically, with Corel's recent acquisition of PerfectOffice, WordPerfect has been subsumed into Corel Office Professional.

Best **Utility**

1 Symantec's Norton Utilities; *£129*
2 Quickview Plus; *£39*
3 Qemm; *£79.95*
4 WinZip; *shareware (US$29)*



Everyone with a PC has their own favourite utility, that one small piece of life-saving software they use almost every day. It's just the sort of thing that makes choosing the best one difficult, especially when you've recently compiled an issue with 50 of the best (*PCW* June). Our judges managed to get it down to a winner and three runners-up, but it's worth stressing that all of the products here are great in their own right.

The honourable mention goes to WinZip, downloadable as shareware from the Internet. As you may have guessed, it provides a quick and easy way of compressing and unpacking files in the popular ZIP format. Guaranteed to make your computer life easier.

Third place goes to the best PC memory manager on the market; QEMM from Quarterdeck. QEMM has become the standard way of dealing with PC memory deficiencies and getting the most out of that first 1Mb of system RAM. The latest release, version 8, helps with Windows 95 applications as well as all those DOS games.

Running a close second is the totally different, yet just as handy, QuickView Plus from Inso. An easy-to-use file viewer that replaces the standard Quickview facility in Windows 95, it lets you display just about any type of file with a couple of mouse clicks. Over 200 file formats are supported including Word, Excel, GIF, TIF, JPG, BMP, RTF and ASCII text. You can also display HTML pages, as used on the Internet, and view and extract data from Zip files.

The winner of our Best Utility award is Symantec's Norton Utilities. A must for any serious PC or Mac user, Norton's has become the standard by which other diagnostic programs are judged and despite some valiant attempts it has yet to meet its match. Its Disk Doctor and UnErase programs are renowned for saving data where other recovery programs fear to tread, and its Speed Disk helps keep working drives in tip-top condition. Finally, Norton Backup provides a fast, reliable way to archive valuable files and keep them safe. An excellent all-round utility.

Best **CD-ROM**

1 Microsoft Encarta 96; *£49.99*
2 You Don't Know Jack; *£29.95*
3 A Stroll Through 20th Century Art; *£44.99*
4 DK's World Reference Atlas; *£69*

This year, multimedia has been a huge growth industry. CD-ROM drives are selling like hot cakes and a staggering amount of new CD-ROM publishers have appeared, hoping to get in on the act.

Education and entertainment are paramount for most people when buying a CD-ROM. The winning CDs this year have been chosen according to these same criteria, and because they appeal to a wide audience.

Dorling Kindersley's World Reference Atlas deserves a special mention as the best of DK's excellent products this year. It is much more than an atlas and includes a wealth of information on geology, demographics and cultural facts.

Third prize goes to Grolier Interactive's A Stroll Through 20th Century Art. There are any number of CDs out there on the subject of fine art but so many of them follow the same repetitive formula — digital images of the paintings and a few words of description. This CD, however, breaks the mould. You are guided around the Maight Institute by a video filmed on a handheld camera, or you can flick through a wealth of information on the art in the collection, the artists and their works. It is truly innovative and very stylish.

The runner-up, You Don't Know Jack, can perhaps only be loosely described as educational, but it had to be the most entertaining CD this year. It comes from Berkely Systems, the After Dark people, and is a trivia quiz of the most bizarre extremes, in the guise of a radio quiz. If you are a dab hand at Trivial Pursuit and have a liberal sense of humour, you could easily get addicted.

Finally, this year's award for best CD-ROM has to go to Microsoft for the Encarta 96 Encyclopedia. This year saw the release of the UK version — all the old data plus a whole host of localised information, originated from a team in the UK. In addition, the US spellings have been purged, the interface has been refined and the content is now outstanding. It is simply the best encyclopedia money can buy.

Best **Game**

1 Duke Nuk'em 3D; *£34.99*
2 Doom2; *£54.99*
3 Command and Conquer; *£32.99*
4 Fatal Racing; *£44.99*

Deciding on the winner of *PCW*'s Best Game award always takes us a lot longer than expected. Every year, the editorial team is forced to spend hours on end playing the latest titles to see which comes out tops. It's a hard life.

Taking fourth and third places respectively this year are the network-ready racing game, Fatal Racing from Gremlin, and Virgin's strategy great, Command and Conquer (C&C). Fatal Racing had the whole office screaming around the Novell network at breakneck speed during the editor's absence, while C&C held its position in the charts and on our reviewer's hard disk for several months.

Doom2 is still so popular that it takes the number two slot and becomes this year's main runner-up. For those who've never seen it (and there can't be many who haven't), it's your typical 3D orgy of death and destruction. Doom changed the face of PC gaming, and Doom2 is more of the same. Rumour has it that a third episode, entitled Final Doom, with two new 32-level episodes, is due soon.

But this year it was agreed by all that the winning game had to be better than Doom2. After much debate only one game fits the bill — 3D Realm's smash hit, Duke Nuk'em 3D. Despite the fact that only the shareware version is available at the time of writing, Duke Nuk'em 3D is clearly ahead of the competition. Everyone in the office, and possibly the PC gaming world, is awaiting the final release from US Gold, which should be on sale by the time you read this.

Duke 3D's key features include fast, smooth-moving 3D graphics at resolutions up to 800 x 600 pixels — almost eight times more graphical detail than Doom. There's a huge array of weapons to choose from, bags of music and speech, and the bad guys show some intelligence. You can choose between a standalone "me against the world" scenario, or the full network deathmatch experience. Best of all, it runs fine in standard resolution on a 486DX2/66 with 8Mb of RAM.

Comms/Online Awards

Best On-line Service/Service Provider

1 CompuServe; *£6.50 per month for 5 hours then £1.95 an hour, billed per minute.*
2 Demon; *£10 per month regardless of hours used plus £12.50 joining fee (once only).*
3 Pipex; *£19.99 sign on. £15 per month unlimited access.*
4 CIX; *£10 sign on. £15 per month for 25 hours, then 1p per minute.*

Best of British — Best UK Web Site

1 Electronic Telegraph
2 BBC
3 Rise
4 Manchester United

Best Web Site by a Small Company

1 Flames
2 Games Domain
3 Private Eye
4 Four 11

It may be dull, it may still be too damn American, but *PCW*'s readers still love CompuServe: once again, it tops the poll as Best Online Service/Service Provider. CompuServe is, of course, now both.

Recent hardware improvements and better support have meant that CompuServe is less likely to be engaged these days and it has recovered from its post-Christmas nightmare when so many people were signing up with shiny new PCs that it simply couldn't cope. But being first in the market still carries a lot of weight. Price wars continue and CompuServe has been foremost in reducing the cost of going online. But with AOL, Europe Online and others now gaining market share, the days of CompuServe domination could be over.

Demon remains number two and will no doubt consolidate its position as the UK's biggest home-grown ISP. It, too, has responded to criticism and improved its technical support (especially for new users) and now has an elegant front-end in the shape of Turnpike. In fact, Demon liked it so much, it bought the company. A new 45Mbit connection across the Atlantic should also help Demon's growing band of users.

On the Web, the Electronic Telegraph continues to set the standard for online newspapers, but the competition from UK rivals The Times and The Guardian means there is no resting on laurels over at Canary Wharf.

Rise is an umbrella site which acts as a cool repository for popsters Pulp and the style mag, *Dazed and Confused*. Manchester United are champions of the Premiership and FA Cup winners, and the club's professional site is also in a league of its own — well done, the Reds.

As for sites by small companies, Flames and The Games Domain continue to be popular, while Private Eye and CyberFi from the Virtual Publishing Company complete the picture in this new category. Both proved you don't need zillions of dollars to produce good online magazines. But with thousands of sites, it's a category that will get harder to judge, and the sites that win are the ones that combine intelligent design with fast access — and content people actually want to read.

Contacts

Supplier	Phone	Website
Apple	0181 569 1199	www.euro.apple.com/uk
Apricot	0800 212 422	www.apricot.co.uk
Armari	0181 810 7441	www.armari.com
ATI	01235 833666	
BBC		www.bbcnc.org.uk
Berkley Systems	0181 741 8299	
Borland UK	01734 320022	www.borland.com
CIX	0181 390 8446	www.compulink.co.uk
Compaq	0181 332 3000	www.compaq.com
CompuServe	0181 371 1000	www.compuserve.com
CyberFi		www.virtual-publishing.com/cyberfi/
Dan	0181 830 1100	
Dell	01344 720000	www.dell.com
Demon Internet	0171 573 4100	www.demon.co.uk
Diamond cards		
(Evesham Micros)	01386 765500	
Dorling Kindersley	0171 753 3488	www.dk.com
Electronic Telegraph		www.telegraph.co.uk
Evesham Micros	01386 765500	
Flames		www.gold.net/flames/
Games Domain		www.gamesdomain.co.uk/
Gateway	0800 973120	www.gateway2000.com
Gremlin	0114 275 3423	

Supplier	Phone	Website
Grolier Interactive	01865 245770	www.grolier.com
GT Interactive (Id)	0171 258 3791	
Intuit	0181 990 5500	
ISO (QuickView Plus)	01344 885224	
Lotus	01784 455 445	
Macromedia	01344 76 1111	www.macromedia.com
Manchester United		www.sky.co.uk/sports/manu/
Matrox	01793 441144	
Microsoft	0345 002000	www.microsoft.com
Netscape		www.netscape.com
Pipex	0181 296 9666	www.unipalm.pipex.co.uk
Private Eye		www.intervid.co.uk/intervid/eye/gateway.html
Quarterdeck UK	01245 496699	http://qdeck.com
Rise		www.rise.co.uk
Serif	0800 924925	www.serif.com/
Simply Computers	0181 498 2100	
Software Warehouse	01645 466 467	
Symantec	01734 814230	
Technomatic	0181 205 9558	
US Gold	021 625 3366	
VideoLogic	01923 260511	
Virgin Interactive	0171 368 2255	
WinZip		www.winzip.com

PCW **Team Awards**

You've seen the winners, you've read the reviews and now it's time to hear the wise words of the *PCW* staff. Unburdened by democracy, objectivity and the readers' selections, the *PCW* team discuss their winning products for 1996.

Our Net man, Cutting Edge Editor, **PJ Fisher**, found Internet growth trailblazing the way, with the major players readying for head-to-head battle. "For me, Netscape continued to set the pace with ever better versions of Navigator. But I was even more impressed with Microsoft's ability to turn around its whole Internet strategy in a matter of weeks, and Internet Explorer 2.0 (soon to be 3.0) is proving a highly worthy contender, especially if you run Windows 95. QuarterDeck's Web Server shows that you don't need to be a Unix-head to set up a personal Web site and is a remarkably easy (and robust) way for individuals and small companies to get on the Web using a PC as a server. Recently, I have been impressed with CyberPilot Pro from NetCarta. This is an excellent Web mapping utility which saves time, both for Web surfers and Web masters. And as for the Internet — well, it just gets more mind boggling every month."

Reviews Editor, **Gordon Laing,** continues his tradition of eclectic product choice, proving that you can't pin a good reviews editor down. "It's been a busy year. NEC's ChromaClear tube technology is pretty cunning. Storage is hotting up with innovative products like Panasonic's PD system and Iomega's long-awaited Jaz drive. Old software favourites such as Adobe Photoshop and Doom continue to impress. Corny as it may sound, the two things that have made the biggest positive difference in my computer life this year were Windows 95 and the Internet. Comms in general have played an important part — using the Lotus cc:Mobile client on a notebook with a data-capable digital mobile phone is about as cool as it gets. Well, not quite. The absolute coolest, and winner of my personal award, is Nokia's Communicator 9000. A PDA, web browser and mobile phone all-in-one. Wow, man."

Iomega Jaz Drive

Eleanor Turton-Hill, *PCW*'s resident technophile and, naturally, Technical Editor, found her favourites off the beaten track of the PC world. "My first favourite is a small wireless keyboard made by Sejin. It sounds like a ridiculous gimmick but it's an extremely useful tool if you're short of desk space. There are no wires, so just move it out of the way if you need more desk space. Definitely one of the most useful products I've come across in the past year.

Then there's Ameol. If you're a CIX user, you'll appreciate this utility. Ameol is an offline reader which helps you to cut your phone bills by automatically dialing up CIX, logging on using your CIX name and password, capturing all unread messages and logging you off again. It's an intelligent and useful product and the best thing about it is it's free. Just download it from http://www.compulink.co.uk/cix/support/ameol/."

Mac aficionado, games master, and Features Editor **Chris Cain** was duly impressed with this year's offering from Apple as well as the introduction of more 3D games and multimedia for the PC. "The Apple 7500/100 provides excellent value, is a well thought out design and has a secure upgrade path. I liked the review model so much, I bought one. The best arcade game of the year is the Sega Saturn version of Virtua Fighter 2 (see ECTS Awards news in *Screenplay* this month). It's the best conversion I've seen and has amazing 3D graphics. Lastly, I'd have to pick Macromedia's Director 5.0. It's the best multimedia authoring tool for CD-ROM and the Internet,

and is much easier to learn than previous versions. Big improvements include movie preload."

News Editor, **Clive Akass**, looks to the future and contemplates its direction and diction. "My regular gripe at the moment is that no-one is making true, usable mobiles. So the Nokia Communicator 9000, a combined GSM phone and personal organiser, would come high on my list of top products because it shows an insight into the way mobiles will have to go. My belief is that sooner or later we are going to agree a standard, reinvented, handwriting for computers to read (see *News Analysis)*. So Graffiti, which does just that on the HP Omnigo and Apple Newton, scores high on the software front, but I'm afraid I'll have to plump for, yawn, Windows 95. It's a hodge-podge, it's infuriating, but it has dragged PC software kicking and screaming into the 32-bit world that hardware entered way back in the eighties.

"My top hardware of the year is Iomega's Zip drive, first of the new breed of cheap mass storage that will be needed for the next stage of multimedia evolution."

Simon Rockman, *PCW*'s Associate Editor, finds one product has caught his attention. "Editorial team choices are usually something special and, taking a bit of a plunge, I'm going to nail my colours to a technology-in-waiting — phase-change printing. This has been around for a while in the form of printers from Tektronix and the Jolt from Data Products, but it's the Tektronix Phaser 340 which really shines. It gives high-quality, reliable and cheap (per-copy) colour printing. Other manufacturers may be looking to lasers but it's the Phaser 340 which has got it right. And they have got it so right that the technology is sewn up with patents, which means it may well take rivals a very long time to catch up. Don't wait. Buy one."

Cyrix 6x86

Intrepid Staff Writer, **Adele Dyer**, reminisces about a few of her favourites. "A couple of things caught my eye this year. Firstly, the appearance of the Cyrix 6x86, not because it was the fastest thing in silicon to come out this year, but simply because it was a good all rounder and it wasn't an Intel product.

"Secondly, the proliferation of document scanners has been astounding. Small-business and home users can scan and OCR their documents without having a beast of a flatbed scanner taking up most of the office, and, like the Visioneer PaperPort, most come with excellent document management software.

"Lastly, there was one utility that I instantly loved — Unitype. It lets you type in whatever type and character set you want in your own word processor, without being driven berserk by the old Alt and three-figure number configuration for getting foreign language characters."

Dylan Armbrust, *PCW* staff writer, has been wowed by the advances of home PCs and the stuff that goes into them. "I was impressed by the concept of the Apricot MS530 Diamondtron. It's an all-in-one, remote-controlled home PCTV. It's not stylish or beautiful and it still has a way to go, but I wouldn't turn it down if you offered me one.

"Also impressive is the introduction of processors with muscle. Intel's Pentium Pro really is a leviathan, especially the 200MHz chip. In a few short years I'm sure we'll all have them in our PCs. But the Cyrix 6x86 chip, which outperforms a similarly-clocked Intel Pentium, has shown that clock speed is now irrelevant and what really counts is design. The irony is that, in terms of CPUs, we ain't seen nothing yet!"

The last word goes to *PCW*'s Editor, **Ben Tisdall**. He was sceptical at first, but has now become a convert. And exactly what faith has he found? You guessed it, Windows 95. "I was cynical about it to start with and nearly driven mad by the way it crawled in 8Mb of memory. But once I had it installed on a 16Mb Pentium and had figured out how to make file extensions visible and how to stop CD-ROMs auto-loading, I grew to like it. I can sometimes go a whole week now without a single system crash; under Windows 3.11 I was lucky to last a day.

"My other favourite is Modemshare from Artisoft, a neat and easy-to-use piece of software that lets you share modems across a network."

Virtua Fighter 2

Five go mad with £2,000

PCW **Location** by John *Millar*
Product by David *Whyte*

"Gosh! I say, you chaps!" exclaimed Ben one sunny morning. "Wouldn't it be a smashing wheeze to get in a boat and sail off for the day to spend all your pocket money? Mum can pack a hamper full of buns and pop and extra wads of fivers for you all!" So off they set…

FIVE GO MAD WITH £1,500 is something of a tradition in *Personal Computer World*. This year, we put the budget up to £2,000 not because you can't buy a complete business system (PC, printer and software) but because the choice is so restricted it would otherwise have made pretty dull reading.

Back in July '93, a typical selection was a Viglen 486SX 25MHz machine with a 120Mb hard disk and 8Mb memory. The software was Works for Windows supplemented by Quicken for Windows and the printer was a monochrome H-P Deskjet 500. But some machines had even lower specs: one prospective purchaser went to Dixons and ended up with a Packard Bell Legend sporting just 2Mb of RAM and an 85Mb hard disk — and this machine was meant to run Windows 3.1!

By June '94, the basic specifications had more or less doubled. A typical example supplied by Gateway, then new to the UK, was a full-blown 486DX 33MHz machine fitted with a 424Mb hard disk and 8Mb of RAM, though it was still only possible to buy Works for Windows and a cheap inkjet printer to complete the package.

Our '94 round-up concluded with the words: "We will repeat the exercise next year, by which time Pentiums will be old hat and Cyrix will have shipped the M1, IBM will have some PowerPCs and the PowerMac will have been around long enough not to be a novelty." Come June '95, none of these predictions had come true. Yes, Pentiums were available but even the 75MHz versions would swallow up most of the entire £1,500 budget. A typical choice was an Evesham Popular DX2-66MHz machine with 8Mb of memory (the memory was an optional upgrade because pre-Windows 95, 4Mb was pretty common on entry-level machines), a 528Mb IDE hard disk and a multimedia kit consisting of a double-speed CD-ROM drive and a 16-bit Soundblaster sound card. Software was supplied by Lotus Smartsuite, then available for just £50.

So what does 1996 bring? Pentiums

And that was when £1,500 was a lot of money?

1979 £1,500 bought a Research Machines 380Z with 16Kb RAM, tape interface and a second-hand teletype printer.
1983 You could get a BBC Micro with disk filing system and 800Kb of storage on two 5.25in floppy drives, a Microvitec colour monitor, Computer Concept's WorldWise and an Epson FX-80 dot-matrix printer.
1986 A system based on an Apricot F10 and a Shiwa CP-80 dot-matrix printer.
1989 By now, you might have bought an Elonex PC 88C with a 10MHz V20 processor and 640Kb RAM for £695, plus an extra £250 for EGA graphics. Add a Star LC10 9-pin dot-matrix printer for £299 and still have enough cash left for a DOS-integrated package like Ability Plus at £199.
1992 A Viglen Genie 386SX cost £847 with 1Mb RAM. An HP Deskjet 500 was a snip at £499, rounded off with Microsoft's Works 2.0 at £145.

are now the standard chip to go for, CD-ROM drives are at least quad-speed, EIDE has displaced IDE on hard disks and the PCI bus is standard on all motherboards. Windows 95 has driven up demands for memory to the point where 16Mb is what you need. Fifteen-inch monitors are also now the entry-level standard, and many people are going one better by opting for the 17in variety. Finally, the Internet phenomenon has occurred, making a modem a tempting add-on for anyone thinking of buying a new system.

All these factors mean it's still just as tough to spend £2,000 wisely and end up with a complete and usable business system. Read on to find out how our five hopefuls fared.

Clive Akass

"Sensible" was my watchword for this feature last year, when I picked a system that might be used by a self-employed plumber or carpenter for accounts, estimates and designs. My choice this year still provides the basics for a small business but I have been frankly self-indulgent on the extras.

The system is built around an AST Advantage PC from Morgan's in central London, which specialises in end-of-line or dated machines. The Advantage's 90MHz Pentium processor and PCI bus are hardly behind the times but it is preloaded with Windows 3.1 rather than Win95, and I suspect AST sold it to Morgan's as an easier option than upgrading.

For £1,000 (well, £999.99) you also get a 540Mb hard disk, 8Mb of RAM, a 14in SVGA colour monitor, 256Kb cache, a graphics card with 1Mb of video RAM, a quad-speed CD drive, a 16-bit Creative Labs sound card with speakers and a 14.4Kb/sec fax-modem. There are two PCI and five ISA slots for expansion.

In addition, you get Microsoft Works which gives you all the basic business applications you'll need, plus Intuit's best-selling Quicken accounts package, Winfax, a CompuServe trial account, and Encarta, Golf and Cinemania CD-ROMs.

I decided not to upgrade to Win95 as part of my £2,000 budget because this would have involved adding 8Mb of costly RAM and a larger hard disk — but the option is open for the future. The modem is a little below par for graphical Internet use but is fine for email and faxes. These are the compromises you make paying Morgan prices: the fact is, you are buying last year's model, albeit a good one.

I did not envisage my small business doing a lot of printing, so a low-cost inkjet with a colour option would suffice. There are several suitable models but I chose the Canon BJ-210C from among the cheapest. It has a street price of around £157 (plus VAT).

For those not interested in fripperies, note that we have here a fairly future-proofed system with all you need for a small business for £1,359 (incl. VAT).

Now for the indulgence. I toyed with the idea of getting the latest Fast AV Master audio-video system which I drooled over at Comdex UK, but at around £1,000 (plus VAT) it would have pushed me way off budget — especially as it likes all the RAM it can get.

So I went for musical toys instead. A good MIDI keyboard was tempting but as a long-time fretboard player I've been intrigued by reports that Roland had produced an acceptable MIDI guitar module, the GI-10P.

Keyboards are natural input devices for MIDI but a guitar is a trickier proposition, offering nothing so definite as a keypress to send information. The GI-10P bundles a pick-up and a sophisticated analogue-to-MIDI converter, which in effect translates a sound into the instructions for playing that sound. MIDI allows you to change those instructions so that you can transform the guitar into an entire orchestra. The Roland pick-up provides a separate output for each string, allowing you to attach a different instrument to each.

The GI-10P, by repute, faithfully tracks the hammering, slurring and bending of strings that gives the guitar its distinctive sound. But at £535, it is a luxury unless you are a professional musician.

Luckily, the ADT SoundBlaster card has an expansion socket for a MIDI synthesiser. Roland provides a suitable daughter board but I took my colleague Gordon Laing's advice and went for Yamaha's cheaper DB50-XG (we have both in the office, so I'll give you my verdict on these, and the GI-10P, in a later issue).

Finally, I picked CuBasis Audio as my sequencer software. This allows you to mix and match MIDI and audio tracks, so that if the GI-10P does not reproduce a pure guitar sound as you would like, you can always record it in the traditional way. Sound clips can be edited in and out just like MIDI clips. That leaves about a tenner to spend on any odd cables you later find you need.

PCW Shopping List

Product	Price
Roland GI-10P	£491.06
Yamaha DB50-XG	£129.36
Cubasis Audio	£212.77
AST Advantage	£1,000.00
Canon BJC-210	£157.00
TOTAL	**£1,990.19** (plus VAT)

PCW Contacts

Canon 0121 680 8062
Harmon 0181 207 5050
Morgan 0171 255 2115
Roland 01792 702701
Yamaha Kemble 01908 366700

Chris Cain

As the other four were either buying or building PCs, I decided to spend my £2,000 on a Mac. Contrary to popular belief, Macs aren't limited to DTP. You can just as easily use one for general business purposes. The only immediate problem I could see was getting a decent system for the money — Apple isn't exactly known for its affordable hardware — but then, as if by magic, Apple dropped its prices.

Today's Mac line-up is split into modular desktops and towers, known as PowerMacs, and complete ready-to-roll systems called Performas. These are exactly the sort of thing I was looking for, so after having weighed my options I went for a top-of-the-line Performa 5320 at £1,469 from Computer Warehouse.

The Performa 5320 has a compact all-in-one design introduced last year with the 5300. The overall look is tidy and allows the Mac to be just as at home in the living room as in the bedroom or study. There are no messy cables sticking out the back and one plug powers both computer and integrated 15in monitor. Smart.

All of this is run by a meaty 120MHz PowerPC 603e, a low-voltage version of the original 601 used in desktop models. As standard you also get a 256K level-2 cache, 1.2Gb hard disk, quad-speed CD-ROM drive and 8Mb of RAM. I opted to spend another £99 on a 72-pin SIMM for a more sensible 16Mb system.

The 5320 comes with 16-bit stereo sound, a 14.4 modem and slots for an optional Apple MPEG card and TV Tuner. It doesn't offer a PCI expansion bus, but then nearly everything you could ever want is either already built-in, or can be added.

The only compromise the 5320 makes is on video. The machine has 1Mb of non-expandable display memory and the built-in monitor offers a maximum of 832 x 624 pixels in 256 colours, or 640 x 480 in thousands. The resolution isn't really a problem because the Mac OS has been carefully designed to look good at most resolutions (unlike Windows, which really needs 800 x 600 minimum) but mathematically the lack of colours at the high resolution is puzzling.

ClarisWorks, the best selling integrated business suite, is bundled with the hardware, along with System 7.5, and around 20 software titles are either pre-loaded or on CD-ROM. Among the best are Dorling Kindersley's educational The Way Things Work, a game called The Daedelus Encounter and Apple's Internet Connection Kit, which provides everything you need to go off and explore the World Wide Web.

For my printer, I chose to stick with Apple and get a matching StyleWriter 2500 colour inkjet. With a resolution of 760dpi x 360dpi in "best mode", CMY and black ink cartridges, 64 TrueType fonts and a 100-page sheet feeder, this nice little number comes in at just £319. It can also take advantage of Apple's ColourSync technology to give the best colour matching possible.

With a complete system now under my belt, I could spend the rest on improvements. Speed Doubler and RAM Doubler from Connectix are two excellent utilities that enhance the performance of any PowerMac and you can buy both together for £50 from Dabs Direct. And it's absolutely essential that every Mac owner should own a copy of Doom II, the best Mac game yet, costing £39.

That still left me £24 to play with so, taking advantage of the generous ten percent discount, I renewed my subscription to Britain's best selling computer magazine (yes, *PCW*!) for only £22.45. The rest went on a well-earned half pint of Fosters and some munchies at the Star & Garter.

PCW Shopping List

Product	Price
Macintosh Performa 5320 8/1.2Gb/CD/14.4	£1,469
8Mb RAM SIMM	£99
StyleWriter 2500 colour inkjet	£319
Doom II	£39
Ram Doubler and Speed Doubler	£50
Subscription to PCW	£22.45
Refreshments	£1.55
TOTAL	**£2,000** (plus VAT)

PCW Contacts

Computer Warehouse 0171 724 4104
Dabs Direct 0800 680000

Adele Dyer

You should have heard the whingeing in the office about trying to get a system for £1,500. In the end, the editor had to give in and let us have an extra £500. The problem was not that we couldn't get a system for £1,500 but that we couldn't get the one we wanted.

Not all of this can be ascribed to greed or being power mad. Since last year, specs have shot up. Pentium 100s are now the entry-level standard and with the

advent of Windows 95, RAM requirements have risen drastically; although you can run it on 8Mb, 16Mb is a sensible minimum.

Additionally, I was not willing to settle for anything less than a 1Gb hard disk and was really looking for 1.6Gb, or above. 256Kb of secondary level cache was quite important, too, as it makes a difference of about 20 percent when running office applications. I had opted to buy direct, so I had to choose from the adverts in the magazine. I wanted to go to one of the larger direct sellers, with a good reputation for technical support.

In the end I fulfilled all these criteria and got a Pentium 166 by settling for Dell. This really surprised me because this particular Dell has brand new technologies, including a new RAM type (SDRAM) and the new Triton 430VX chipset. In fact, it is similar to the one we reviewed in last month's *Pentium 166s* roundup, but it's the scaled-down version with only a 1.6Gb hard disk and a less impressive graphics card and multimedia kit. However, it does have 512Kb of L2 cache and as a basic machine it promised to do everything I want. MS Office Pro is included in the bundle, so it really shaped up very well as an office workhorse.

The rest of the spec was less important. Ideally, I was looking for a video card with at least 2Mb of VRAM and really wanted a Matrox Millennium, or a GraphixStar 700. Nevertheless, the STB card that I got will do me for the moment. Similarly, the multimedia is not as high-level as it could be. If you really want top quality audio, then a decent soundcard is a must but if all you want is to listen to the odd CD, then the on-board Vibra 16 chip on the Dell will do fine. The CD-ROM drive is a six-speed one — always useful, even if you only want to load applications from it.

But I did want a decent pair of speakers. After a hunt through the pages at the back of the magazine, I found the same speakers as Dell was offering, rebadged, but at nearly half the price: £45 from Watford Electronics, as opposed to £80 from Dell.

When it came to deciding on a printer, I opted for a laser rather than a colour inkjet. Since I have only included Office Pro in the bundle, there is not a great deal of scope for colour printing. I'm probably going to get shot down in flames for saying this but there is something inherently naff about spot colour on a letter. So instead I opted for a cheap, small laser, which will give me much better quality monochrome printing than an inkjet, for around the same price.

The final choice was the Canon LBP 460, a GDI with a print quality of 300dpi, which will produce four pages per minute. I picked this up for a snip, at £265, from Dabs Direct.

After all that, I was left with £42 burning a hole in my pocket. That was not nearly enough for half the fancy applications I could have chosen, so I finally opted for some anti-virus software — better to be safe than sorry — and bought a copy of Norton Antivirus from Watford Electronics.

PCW *Shopping List*

Product	Price
Dell Dimension XPS P166s	£1,649
Canon LBP 460w	£265
AT75 80W Ultra Power speakers	£45
Norton Antivirus	£42
TOTAL	**£2,001** (plus VAT)

PCW Contacts

Dell 01344 720000
Dabs Direct 0800 558866
Watford Electronics 01582 487777

PJ Fisher

My first stop was the plush new Gateway 2000 showroom in Covent Garden. Around 15 people were browsing the Gateway range with two members of staff ready to welcome them into the Gateway family. You can't take anything home, so if you do want to buy a Gateway there's a freephone number for you to ring in your order and it will take ten days.

Man, was I impressed with this dynamic way of selling. So it was on to Dixons in Oxford Street. The atmosphere couldn't have been more different. A Saturday afternoon and the first sunny day for weeks and Oxford Street is heaving. Inside Dixons is like it always is; bewildering. Packard Bell, Compaq and Apricot machines were stacked high on the shelves.

My intention of getting a 16Mb machine evaporated quickly. Every machine at my price point came with 8Mb only. An extra 8Mb fitted by Dixons would cost nearly £4,001, so I decided to try to make do. After all, they say you can run Windows 95 with 8Mb.

I decided to approach a salesperson: "I want to buy a PC. What are these Packard Bell's like?"

"Er, they're really good," came the authoritative reply.

Armed with this knowledge, I looked at a Packard Bell P75 system that with £100 off was priced at £1,499. But it really wasn't that well specified: only a 75MHz Pentium, 850Mb hard disk and 1Mb VRAM. There was no modem and I wanted to connect to the Internet. Like all Packard Bells, it was pre-installed with Windows 95 and had a good range of software including Works, Money and Lotus Organizer. But it was ugly.

While I was browsing, I did notice a good deal on a Lexmark ColourJet 1020 at £199.99, including a free copy of Corel Draw 3. Even better was the Canon LBP460CA for £349.99 which was what I had set my heart on.

The PB P100 would give me 100MHz speed for £1,699, but I still wasn't convinced. I had no modem and I really couldn't live with that weird combined monitor and speaker system.

Looking over to the neighbouring racks, the Apricot P120 caught my eye. A 120MHz system, 1.2Gb HD, fax modem and four-speed CD, all for £1,799 — that was more like it. What's more, it looked good and seemed well built, too. A definite possibility. But I wasn't yet convinced to part with all my cash, so in the end all I bought at Dixons was the Microsoft Easyball for my nephew when he comes around.

Next stop was John Lewis, the finest department store on Oxford Street. The computer department is up on the fifth floor where the IBM, Compaq, Packard

Bell and AST ranges are all neatly displayed. It also has a good range of accessories.

Ignoring the Packard Bells and Compaqs, I was tempted by the IBM Aptiva 2144-141. A 100MHz, 8Mb machine with a 1.2Gb hard disk: at £1,799 it seemed OK but the salesman began steering me towards the AST range. Initially, I was sceptical, but then it began to make sense. AST is a good brand. The machines look smart and seem solidly built. And the price was outstanding.

I could have an AST Advantage 623, with six-speed CD-ROM drive, 100MHz, 28.8 fax/data modem built-in and a good looking pair of Labtec speakers, as well as Encarta 96, Cinemania 96, AST Works and a free CompuServe trial — all for £1,599. It wasn't as fast as that Apricot, back at Dixons, but what really swung it was the John Lewis free two-year on-site warranty.

I still had plenty of money left over so I decided to splash out on a Psion 3a, PSIWin, a copy of MS Works 95 and finally, my Canon printer which was £20 cheaper than at Dixons. Well, John Lewis is never knowingly undersold.

So my PC system was complete and ready to take home and work out my VAT returns. Taxi!

Gordon Laing

For the past couple of years I've used this feature to sing the praises of the Apple Mac and fight for its cause… you know the sort of thing. I remain a huge fan of the platform, but I'm abandoning it this year in favour of my screwdriver, soldering iron and nylon shirt. That's right, I'm building my own PC.

There are only three reasons why you make your own anything, be it a bathroom suite, kit car, or Victoria sandwich cake. Number one: you can completely customise, and only go for precisely what you want. Number two: it's often cheaper than going for the ready-made solution. Number three: you get the joy and satisfaction of having done it yourself.

Sadly, in these competitive days, examples of reason number two are becoming rarer than a lone twitcher. Particularly so in the case of PCs: building your own may well cost considerably more than popping down to the shops, or picking up the phone. The big box shifters have such good deals, especially with software vendors, that they can throw in copies of Windows 95 and Office Pro 95 for next to nothing, whereas buying these separately would set you back hundreds of pounds.

Perhaps you have a few parts lying around that could be recycled? A case, power supply, mouse, keyboard and floppy drive, along with the all-important software could begin to make the homebrew PC a financially attractive option. However, it's still not going to save you a fortune so the following is aimed squarely at those for whom reasons number one and three fill their hearts with inspiration.

I could build a PC with E-IDE and all the same components as the one found in virtually every box out there — a clone of a clone, so to speak. But since we've already given up on the idea of saving money, I'll suggest something just a bit different — after all, that's the fourth and lesser-known reason for building it yourself: originality.

The best place for great prices is the *Direct Buyers World* section at the back of *PCW*: just browse and note down the cheapest deals. I've quoted the best prices found in last month's issue.

Years ago, I discovered that I/O makes or breaks a system. Consequently, mine is based around a fast and expandable SCSI (pronounced scuzzy) bus. I've chosen Adaptec's 2940UW PCI Ultra Wide adaptor with a bandwidth of 40Mb/sec, costing £194. It can support up to 15 internal or external devices, so even though I'm only fitting a hard disk and CD-ROM for now, I've got the future covered.

SCSI peripherals include CD Writers, scanners, tape drives, and removables. Into this, I'll connect a 1Gb Conner CFP1080S hard disk (£167), and a Toshiba 3701 6.7-speed CD-ROM drive (£169) delivering 1Mb/sec.

Decent graphics performance is essential too. I've opted for the quick VideoLogic GrafixStar 700 with 2Mb, costing £179. This will drive a superb NEC XV15+ monitor, that you can buy for a mere £270.

My motherboard is an Asus P/I-P55T2P4 with 256Kb of burst pipeline cache, together costing £156. Onto this I've fitted 16Mb of 60ns EDO RAM in two 8Mb 72-pin SIMMs, leaving two slots free. I could only afford an Intel Pentium 133MHz (£209), but like the 100MHz and 166MHz chips, it has the advantage of

PCW *Shopping List*

Product	Price
AST Advantage 623	£1,361
Canon LBP 460	£280
Psion 3a (512k)	£212
Microsoft Easyball	£21
PSIWin	£67
Microsoft Works for 95	£59
TOTAL	**£2,000** (plus VAT)

PCW Contacts

AST 0181 587 3000
Canon 0121 680 8062
Psion 0171 262 5580
Microsoft 0345 002000

driving the board at a fast 66MHz.

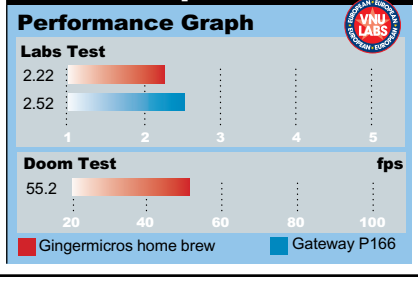
Case, power supply and floppy drive came to £86. There was not enough cash for a laser, so I plumped for the excellent Canon BJC-210 colour bubblejet (£169).

Now for the Microsoft portion: Windows 95 (£111) and Works 95 (£52). My choice of rodent is a Logitech Pilot mouse at £16, while the keyboard is courtesy of MicroSpeed at £44.

Building your own PC is as easy as Lego, with the added excitement of static and incorrect motherboard jumper settings. Mine took an hour and a half to build, split roughly down the middle between construction and software installation. The only tools you'll need are a Philips screwdriver and a bottle of wine: I recommend a Chilean Pinot Noir and Cono Sur does a reserve bottle for £6.50 that really does the trick.

PCW Shopping List

Comparative



Product	Price
Adaptec PCI 2940UW	£194
VideoLogic GrafixStar 700	£179
16Mb EDO RAM	£180
Conner 1Gb SCSI hard disk	£167
Toshiba XM3701B 6.7-speed CD-ROM drive	£169
Intel Pentium 133MHz	£209
Asus P/I-P55T2P4 motherboard	£156
NEC XV15+ monitor	£270
Canon BJC-210	£157
Microsoft Windows 95	£111
Microsoft Works 95	£52
Microspeed keyboard	£44
Logitech pilot mouse	£16
Case and PSU	£86
Screwdriver	£3.50
Cono Sur Reserve Pinot Noir 1995	£6.50
TOTAL	**£2,000** (plus VAT)

PCW Contacts

All (except wine and screwdriver!) from our *Direct Buyers World* section at the back of the magazine.

At the end of the day...

There are no winners in *Five go mad*, only opinions, but here is a completely partisan view of The Five.

Clive Akass went the Morgan's discontinued stock route. With just £1,500 for a complete business system this made sense but with the budget increased to £2,000 it seems a lot of money to spend on yesterday's technology. Particularly at the small office home office (SOHO) end of things Windows 3.1 is on the way out. Frankly, Clive's effort doesn't really fulfil the brief as roughly half his notional budget was spent on musical extras.

Adele Dyer had a better stab at the target. She at least managed to buy a state-of-the-art machine with plenty of memory and hard disk space. Although Dell isn't one of the cheapest direct suppliers it does offer some very attractive bundles. It's able to buy Microsoft Office, for instance, very cheaply and can pass the saving onto its customers. Dell also has a decent reputation for service and support which makes it a safe choice. As they used to say of IBM, probably no-one has ever been sacked for buying Dells. For business use, Adele's choice of a laser printer also makes a lot of sense: the higher printing speed and lower running costs will, for most people, outweigh the advantage of colour.

Gordon Laing chose self-build. For most business users, homebrew is an indulgence. You generally end up paying more in the end and for a decent price you have to shop around like crazy. Sourcing components from multiple sources has its own problems, with half a dozen companies to chase up instead of just one. For the enthusiast, though, it's great to have that much control over the final spec. And if you already have usable components from an old PC hanging around, it can make financial sense too.

Paul Fisher went to a retail outlet. Research shows that very few *PCW* readers choose to do so and looking at Paul's selection it's not hard to see why. But for some, the pros of a rock-solid two-year John Lewis guarantee will outweigh the cons of an indifferent spec.

Paul's spec is not all bad news, either. Although his final choice only has 8Mb of memory that doesn't matter if he only plans to use Microsoft Works and is prepared to eschew the many extra, but often unused, features of Office. Paul also found enough spare cash to add a Psion Organiser to his list.

Followers of Chris Cain's articles in *PCW* will know that his enthusiasm for all things Macintosh borders on the obsessive. However, his selection demonstrates that it's possible to buy a highly capable Macintosh system for a price comparable to a PC. There are few compromises in Chris's selection and 16Mb of memory with the combination of Speed Doubler and RAM Doubler utilities makes for extremely snappy performance.

Any better ideas? If you have other views about how to go mad with £2,000 or violently disagree with any of our selections, please email us at PCW@VNU.CO.UK or write to us at the address on page 49.

Ben Tisdall

The best-laid scans

Three flatbed devices show Gordon Laing what they can do.

Scanners are beginning to sell in big numbers and their popularity is largely due to the improving OCR (optical character recognition) process. Most manufacturers have realised that many users don't need colour and don't want a large flatbed device on their desk. They have developed tiny document scanners dedicated to dragging a page of A4 through itself, somewhat like a fax, then OCRing it.

We rounded up eight such document scanners in *PCW* March 1996, and those who definitely only want to OCR or fax sheet paper should look no further. However, a flatbed is essential if you want to scan anything thicker than sheet paper, such as an open book, a magazine page, the side of a box or even an object like a set of keys.There are one or two colour-capable document scanners on the market, but a flatbed is still the only serious colour solution.

Prices have dropped at the entry level, and our three contenders for the thrifty throne are not unknowns. They are products from the three largest sellers of colour flatbeds in the UK.

Hewlett-Packard's ScanJet 4P, Epson's GT-5000 and Umax's Vista S6E are brand new models. All three have an optical resolution of 300dpi and work in 24-bit colour. All offer interpolation, the process of guessing non-existent inbetween values to bump up the apparent resolution. The HP interpolates up to 1200dpi, the Epson to 2400dpi, and the Umax to 4,800dpi. Check out the scans of the same six-point letter "g" at each of the unit's highest interpolated resolution to see how they compare [page 136].

The HP 4P boasts a maximum scanning area of 216 x 356mm, compared to the 216 x 297mm of both the Umax and the Epson: that's a 59mm (around 3in) difference in the HP's favour, and essential for long documents.

The HP, however, is the largest box overall, measuring 580 x 365 x 110mm as opposed to the Umax's 526 x 336 x 131mm or the even smaller Epson at 443 x 297 x 87mm. It doesn't sound like a big difference but the HP occupies significantly more desk space, making the Epson look tiny in comparison. This is an important consideration with all flatbed scanners, since the area they occupy on your desk is effectively dead; nothing can conveniently or safely be placed on top of the lid for long.

All three scanners are SCSI devices requiring a SCSI interface on your PC. If you don't already have one fitted, you could use the ISA SCSI interface cards supplied with each model. Umax bundles a rebadged Adaptec 1502T, Epson supplies an Adaptec 1510, while HP has gone for an 8-bit NCR model. If you're buying a SCSI card independently we recommend an Adaptec model, particularly a PCI version if you want high performance from other SCSI devices such as hard disks.

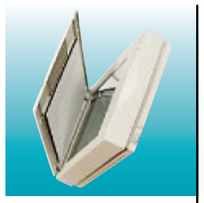
If you want to scan film properly, you'll need a transparency adaptor. These are usually replacement lids with their own light source. Out of our three contenders, only Umax offers a transparency adaptor option, at an RRP of £495, or between £300 and £400 on the street. Umax also offers a Pro version of the S6E, which comes with the transparency adaptor and a full copy of Photoshop, for £1,145 RRP or around £699 on the street.

If you're into OCR and fancy leaving the scanner to feed through a wad of loose pages, you'll need an Automatic Document Feeder, or ADF. HP offers one for its ScanJet 4P for £415 RRP, while Umax's costs £495 RRP. Epson does not offer a transparency adaptor or ADF for its GT-5000.

As regards software, Umax bundles Adobe Photoshop 3.0.4 LE and Presto, an OCR and document management package. Umax supplies the same TWAIN driver with all its scanners, and it's superb. Expert users can select highlight and shadow points, or adjust tone curves and histograms, while beginners or lazy users can tick auto-adjust for an instant, high-quality exposure and colour correction.

Hewlett-Packard supplies Corel PhotoPaint 5 Select and management software designed originally for the Visioneer Paperport document scanner. Launching it, or selecting Acquire from the File menu, gives you the HP PictureScan Task manager. Four buttons optimise the scan for pictures, OCR, Fax or other pages. Clicking any of these straight away makes a preview scan and automatically selects any objects in the window.

The software is extremely easy to use. During installation you are asked what kind of printer you plan to output on (this can be changed later). With printer type and user optimisation information, the package is capable of working everything else out. In fact, in many cases it doesn't even bother waiting for confirmation, instead shooting off for the final scan by itself. This is great if you want foolproof, quick scanning, and it is ideal for beginners, but I found it a little patronising, preferring instead to select my own options. But this can be tricky with HP's software, which successfully hides the ugly technicalities.



Epson GT-5000

HP ScanJet 4P

Umax Vista S6E

Epson bundles full Corel PhotoPaint 5 for image editing and retouching, and TextBridge OCR and Xerox Colour Document Management Suite, which includes Visual Recall Personal Edition to look after your document needs. Curiously, CorelDraw 4 is also included. (Both CorelDraw and PhotoPaint are currently on version 6.) Epson's TWAIN driver is good, but does not match the sophistication of Umax's.

When it comes to performance all three scanners were extremely quick, but the Umax had a slight edge overall. Ten seconds for a colour preview on the Umax and the Epson compared to HP's 15 seconds. The Umax took 17 seconds to scan an A5 photo in 24-bit 100dpi, compared to HP's 22 seconds and Epson's 25. A4 mono speeds using settings suitable for OCR were even closer.

We ran the same quality tests as in the last *PCW* scanner group test. These are based on the Agfa IT-8 target, boasting a tricky range of colours and grey levels. All three scanners resolved

the same number of grey levels as easily as units costing over £1,000 last year. The Umax won here, resolving the most greys very distinctly. It was closely followed by the Epson, then the HP which, while good, wasn't quite so clearly resolved as the other two.

As far as colour was concerned, the HP had many gaps in its range. The Umax and Epson ranges were smooth, without gaps, and only fell off at the extreme ends of the spectrum. Consequently these would fare better than the HP after further optimisation; Epson had the slightest edge over Umax.

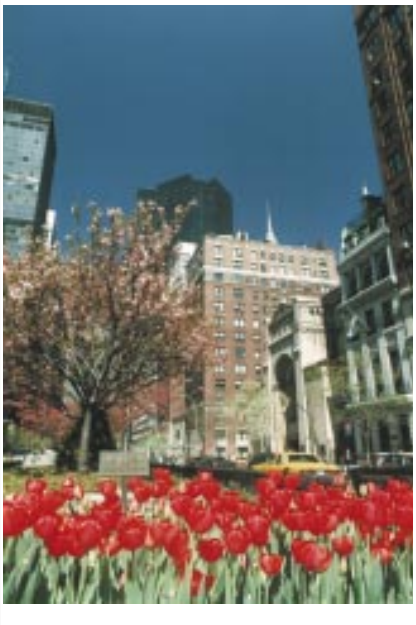
As to which is best overall, it's a very close thing. Those intimidated by the scanning process should look no further than the HP which, once installed, will hold your hand at every step. Epson's scanner offers great quality and is ideal for situations where space is at a premium. Ultimately the Umax Vista S6E gets our top vote, being a slightly better overall performer with preferable software, more flexible hardware options and costing a little less, to boot.

But all three scanners are absolutely fabulous, and would have been highly recommended in the £700-£1,000 bracket of last year's test. That they can be picked up on the street for between £300 and £400 is truly remarkable.

The original 5" x 7" colour print, scanned using a reference professional drum scanner

A six-point letter g scanned at the highest interpolated resolution of each scanner. Each colour photo was scanned using the scanner's automatic settings.

Epson GT-5000



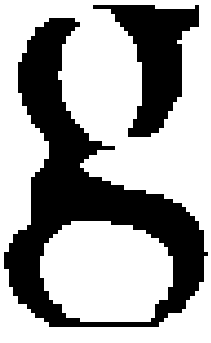
PCW Contacts

Epson GT-5000

Price £350 (street)
Contact Epson 0800 220546

Good Points Compact size and quality.
Bad Points No ADF or transparency options.
Conclusion Superb unit, bettered only by the Umax.

HP ScanJet 4P



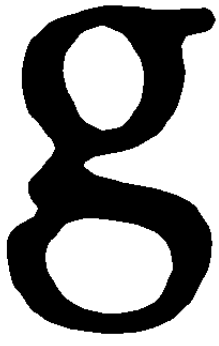
PCW Contacts

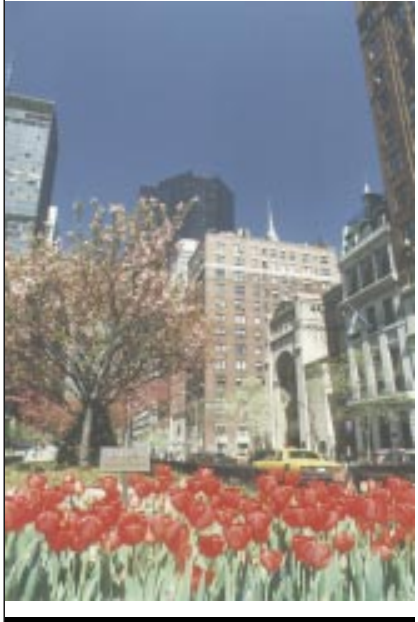
Hewlett-Packard ScanJet 4P

Price £369 (street)
Contact Hewlett-Packard 0990 474747

Good Points Extremely easy to use.
Bad Points Could infuriate experts.
Conclusion Excellent entry-level flatbed, particularly for novice users.

Umax Vista S6E





PCW Contacts

Umax Vista S6E

Price £299 (street)
Contact IMC 01344 872800

Good Points Great software and quality.
Bad Points Not as easy to use as HP's.
Conclusion Has the overall edge, unless you're a complete novice.

Mind your language

How do you get from français to italiano? Teaching computers to digest text and spit it out into something palatable in another language has proved to be a tough proposition. Adele Dyer samples some of the leading translation packages.

SOFTWARE THAT AUTOMATICALLY translates languages is considered by some to be the best idea since the wheel. It has revolutionised the translation of many documents and has been especially useful with tedious technical manuals. With machine translation (MT), translators have been able to sidestep the long hard slog of routine translations and use their skills instead to post-edit the output.

Yet for the average user, MT is still a deeply unsatisfying process. You cannot give a passage of text to a piece of software and expect it to come up with a perfect translation. Instead you get just the gist of the text, which you might want to see yourself but could not send out to clients. But things are slowly improving, with many products on the market aiming to make translation easier and coming up with new strategies for increasing its accuracy.

At the moment, MT falls into two categories: the real world applications that commercial enterprises use to translate large portions of their documents; and the world of academic research. One is geared towards providing solutions that can be tailored to specific circumstances and give workable results, while the other is more interested in posing tricky problems and stretching the limits of the science.

In the real world, the uses of MT are limited and so is the scope of the language that can be successfully translated. It is best suited to dealing with mundane translation needs — legal documents, engineering manuals, weather reports and the like.

All text to be translated by machine has to be pre-edited to avoid syntactical difficulties, to check all the words are in the dictionary and to strip out any ambiguity. Editing formulaic text is a simple task, and the end results are much more likely to be consistent when translated into a number of languages.

The simplest implementations of MT are the most successful. The Canadian weather forecast authority has a system known as METEO that translates weather reports, sent from French-speaking Canada, into English and vice versa. It has a dictionary of only 2,000 words, of which 700 are place names. The translation produced is near perfect because the input is expected, if not predicted. A shipping forecast follows set patterns and these are easy to program into the system.

Ideally, everyone would like to see a system that could translate one text into numerous other languages all in one go. At the moment, however, it is only possible to translate language pairs, for example from Spanish to French and vice versa. However, work is underway to create a universal grammar that would allow any language to be translated into any other. One system could, for example, take an Italian text and translate it into all the other languages spoken in the European Union.

Until now, home users have had only two options: to translate from a foreign language into their own and get a rough approximation, or to translate from their own into a language they do not fully understand and risk getting it badly wrong. Now another approach is available. Several systems, mostly under development, offer simple sample sentences that can be assembled and then translated, doing away with the problem of mistranslations.

We have looked at a variety of translation packages, each tackling the subject in a different way. Which one is right for you depends on your language skills and how you intend to use them.

Globalink series

Globalink produces a range of translation packages, all based loosely on the same engine but with individual dictionaries. The three we looked at were the high-end Power Translator Professional, the Deluxe version and the bottom-of-the range Language Assistant.

Power Translator Professional is a commercial package aimed at those who regularly translate a large number of documents. The dictionary contains more than 250,000 words and you can add specialist dictionaries, of legal, banking, chemical or military terms, for example. Each of the three languages (French, German and Spanish) has different specialist dictionaries. Dictionaries can be tailored, either by one user or by several users accessing them over a network.

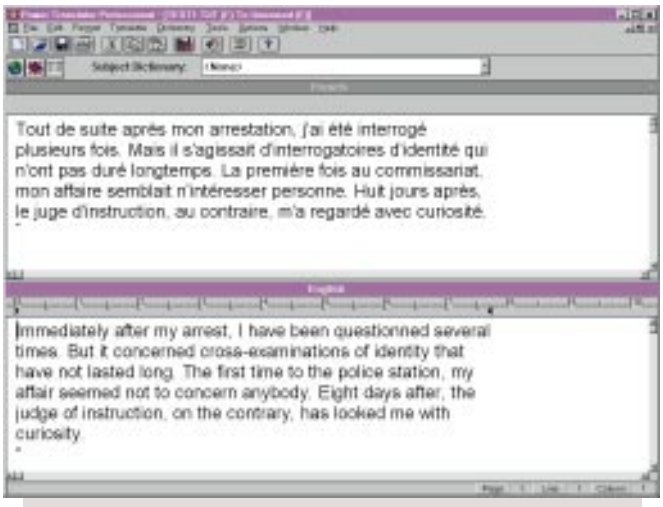
We tested the software with three pieces, selected for their different styles. None were pre-edited. The first, from *L'Etranger* by Albert Camus, was chosen for its simplicity of style. Giving literary passages to an MT system is usually disastrous, but this one coped well. The translation was not perfect, the French narrative past tense was mistranslated, but it was a good attempt and easy to post-edit.

The second extract was a piece of literary criticism by Émile Zola. Again the output was good, but not perfect, and the translation fell down on idiomatic phrases. Lastly, we tried a piece from *Le Monde*, famed for its precious prose style. This was the least successful of the three samples but the program still conveyed the gist of the passage.

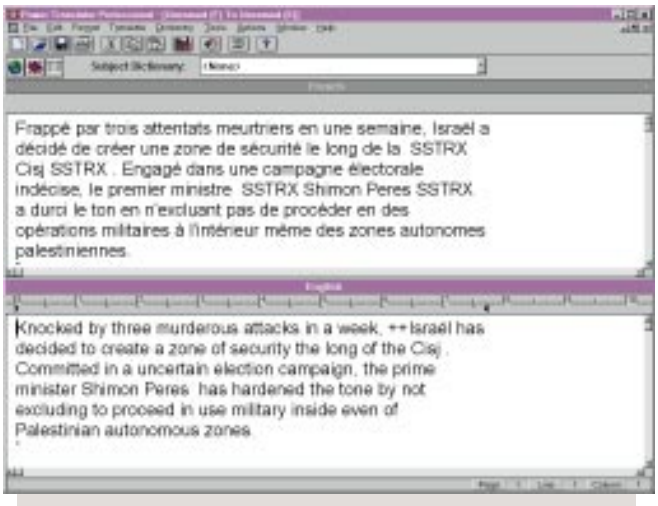
In the reverse direction the output was

PCW Illustration by Nick *Grant*

Power Translator Professional



An extract from Albert Camus translates reasonably accurately, although the result needs some post-editing



A story from the prestigious French newspaper **Le Monde** *gives Power Translator a little more trouble*

equally patchy. The package did well on a piece from *The Guardian* but was unable to cope with the conversational tone of a book on speech recognition.

There were one or two glaring problems. The system was incapable of correctly translating the English simple past, giving a past participle only in the French. And if the verb was with a pronoun, for example "he said", rather than with a noun ("the man said"), the program could not translate correctly. The program can also become confused between adverbs and direct and indirect objects. Such basic faults are disappointing.

Power Translator Deluxe is a step down from the Professional version. It has the same translation engine but a smaller dictionary and no specialist dictionaries or networking facilities. Tested with the same pieces, it produced exactly the same output.

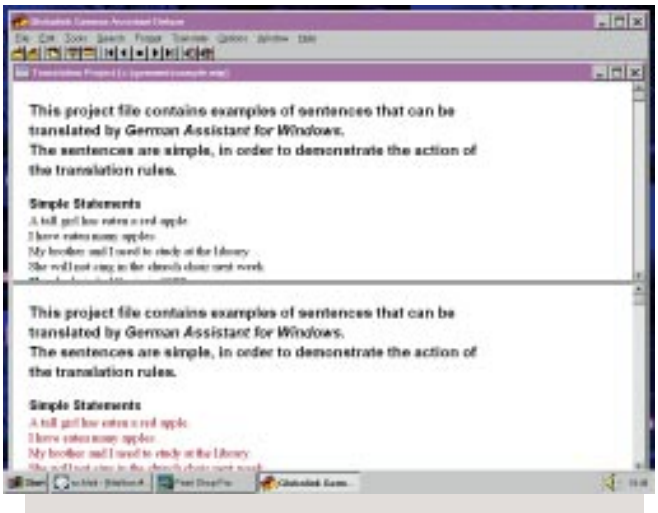
Globalink's **Language Assistant** series is aimed at home users wanting to translate simple prose. It covers French, German, Spanish and Italian and will translate both to and from the chosen language. It is intended only to give a rough draft of the passage. Instead of huge specialist dictionaries, the emphasis is on interactive translation, helping the user to find the right context and to conjugate verbs.

The program has limitations, especially when it comes to the construction of German sentences. It has a tendency to put the verbs in the wrong place and mixes up some constructions, such as time, manner and place. You can use it to translate directly but you will get more out of the system if you choose the interactive mode. This also makes it a broader tool, good for some aspects of language learning.

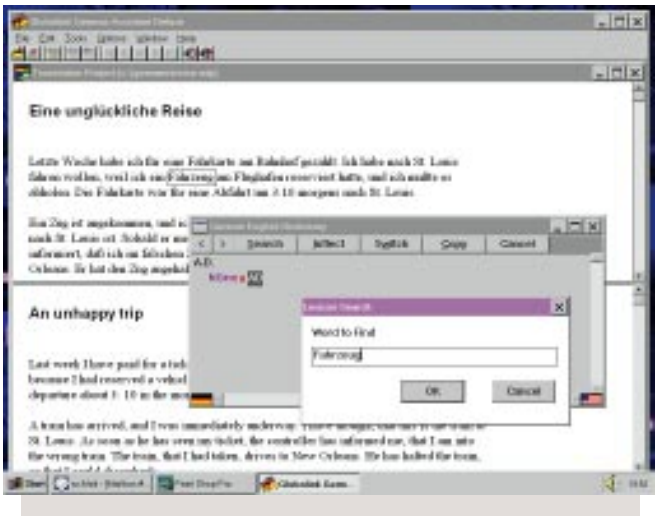
PCW Contacts

Globalink series
Price Power Translator Professional (French) £399 (plus VAT); Power Translator Deluxe (French) £129 (plus VAT); German Assistant £49 (plus VAT).
Contact Globalink 0800 752752

German Assistant Deluxe



The screen is divided into two windows: one for source language and another for keying-in the translation



Individual words can be looked up to help the user define the context and translate interactively

Word Translator

This is a handy utility for translating individual words. The main part of the package consists of dictionaries of more than 22,000 words in each language. They can be used to translate individual words in a document and there are utilities for translating either interactively (you prompt the system to make the right choices) or directly (it does it all itself).

The system appears not to have any rule base — a coherent way of recognising what parts of speech it is looking at and translating them accordingly. The dictionary gives more than one translation for many words. For example, "the" in English is listed with all three French equivalents and the quick translate facility chooses the first one as the default. The resulting translation is rougher than sandpaper.

In other ways the package has great strengths. It can be integrated into your normal word processor, so you can type as normal and then just look up and paste in a word without having to either launch another memory-hungry application or cut and paste between applications. Word Translator takes up a mere 2Mb of disk space, integrates seamlessly with Word and supports WordPerfect, AmiPro, Write and Works.

As a translation system it is patchy, but as a utility it is extremely good value. You might not be able to use it in the same way as the Language Assistant series, but at a fraction of the price it is perfect for those with a working knowledge of a language.

PCW Contacts

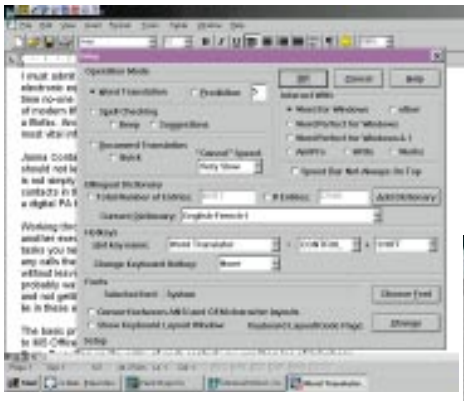
Word Translator
Price £39 (plus VAT)
Contact Creative Technology 01889 567160

TransWrite

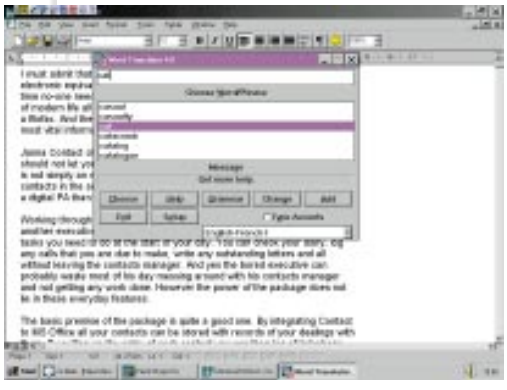
Here is one of the new breed of limited translators that can offer perfect output. The idea is simple: the application contains a database of sentences and phrases and their correct translation. By clicking on the sample sentences you can create a number of business letters that are guaranteed to be correct.

The application is very limited. You will not be able to translate a piece of free prose but you can at least be sure of sending out a correct letter in the first place. The distributors claim the package is intended for those who have no knowledge of a foreign language but if

Word Translator



Handy for linguists, Word Translator will give equivalents for individual words and can be integrated into your normal word processor. This is the opening screen



You can look up a word and paste it in without having to launch or swap in and out of other applications

Translation services on the Internet

The Internet is likely to explode the use of MT. It is all very well to talk about a global community, but if you visit only English language sites you could be missing out. A number of companies are now producing packages to maximise access to the Web. Globalink has been pressing especially hard to get translation software running in tandem with the Net and has started various projects, including one linking schools across the globe which communicate with the aid of Globalink translation packages.

The Globalink Web page (www.globalink.com) features a new button that will take you directly to a translation service. Using Globalink's Barcelona technology you can enter up to 1,000 words directly onto its Web page. These are translated by machine, to give a general gist of the passage. The service is free at the moment and should take less than 24 hours.

Alternatively, you can download the company's Translation Direct software. You enter the number of words you want translated, the language and the level of service you require: the software estimates the delivery time and cost so you can decide whether to proceed with the idea. The machine translation output is post-edited by native speakers, hence the charge.

CompuServe also has its own translation service, offering both machine and human translation. There is a charge on top of the usual CompuServe subscription but the company says it has a global membership needing to exchange mail and documents, so it is an extremely valuable service. It covers English, French, German and Spanish, any one of which can be translated into any other. You can either choose machine translation at four cents a word, or translation post-edited by native speakers at ten cents a word. The output should come back to you within 24 hours; it is often much faster.

The Globalink Web page will take you to a translation service

In the beginning

As infants, we learn to speak by a process of deduction based on what we can see and hear compared with the noises that are being made at us. The main problem for a computer is that it has only the information we give it and cannot use the outside world to make leaps of logic. Language therefore has to be broken down into patterns of speech. The parts of speech become variables, while the words are parameters of those variables.

If you accept the basic premise that all sentences must have a verb, you can start to build up a basic pattern. The order "March!" is a simple imperative present tense and can stand on its own. The subject of the verb is implied, not stated. For machine translation to be successful in this case we would have to include in the code a rule which stated that a single verb followed by an exclamation mark implies the imperative. Any verb and associated information can be classified as a verb phrase, that is:

```
sentence IF verb_phrase
```

The next step is to deal with the subject of the verb. Subjects can be anything from a simple number or pronoun ("I", "you", "he") to a complex structure including an article ("a", "some" or "the") and one or more adjectives. For example:

"Children";

"Some children";

"Dirty children";

"The naughty, dirty children".

The easiest way to deal with all these permutations is to call a subject a noun phrase. Combine this with the first rule and you have two options:

```
sentence IF verb_phrase OR
sentence IF noun_phrase AND verb_phrase
```

When you try to break down verbs, or verb phrases, the first problem you encounter is compound verbs. For a verb such as "have eaten", you have to look up both the auxiliary ("have") and the past participle ("eaten"). You do not want the machine to think it has the third person plural simple present tense of "to have"', so you need to write the code in such a way that it presumes all verbs to be compound, unless it finds a noun phrase following after the apparent auxiliary. So in the English grammar you would have to have something like this:

```
verb_phrase IF auxiliary AND participle OR
verb_phrase IF simple_tense
```

If you add direct and indirect objects, these refer to the verb and so should be included in the verb phrase. Thus you could have a grammar structure such as :

```
verb_phrase IF simple_tense AND noun_phrase
```

Time phrases, too, are part of the verb phrase but should not be translated either as direct or indirect objects, or as adverbs. For instance, you would not want to translate the following two sentences in the same way: "He arrived late" and "He arrived flustered".

Once you have broken down one language into its constituent parts, can you simply build up the new language in the same way? The answer is no. Every language has its own rules about how a sentence should be constructed. When you have broken down a sentence in one language into its syntactical and semantic roots, then you have to bodge and manhandle it to make it fit the target language structure.

To take an example: German splits verbs, putting participles at the end of the sentence while the whole of the verb automatically leaps to the end of the sentence in subordinate clauses. The sentence "He sat on the chair reserved for the chairman" would be constructed as "He sat on the chair, which for the chairman reserved was" — imagine the bodges in code you need to get that to fit!

Today's machine translation systems may appear to be ineffectual, but they are highly complex pieces of software. If language was rational, machine translation code would be no more difficult to write than for a word processor. The progress of such systems is handicapped by the complexity of our thought patterns.

you are to enter into a correspondence it might help to have some idea, just to read the letters you receive in reply.

The options contained are many and varied enough to allow you to write a coherent letter, and you can add your own sentences if you know them to be correct. However, the package as it stands should see you through more occasions than you would normally need.

Installation was far from easy and it was only after trying it on three different machines that we finally got it to load correctly. The installation program ran without a hitch but when we tried to run the application, it crashed repeatedly. There was nothing in the documentation to explain this.

However, once the program is up and working, the interface makes it extremely easy to find what you need and to build a sensible letter. The translation is almost instantaneous and you can switch between source and target languages. Within its limitations, this is one of the most useful translation packages on the market.

TransWrite

The secret of programs like Transwrite is to give you set phrases that you can assemble to concoct a perfect letter

PCW Contacts

TransWrite
Price £199 (plus VAT)
Contact ProLang Interactive 01734 773423

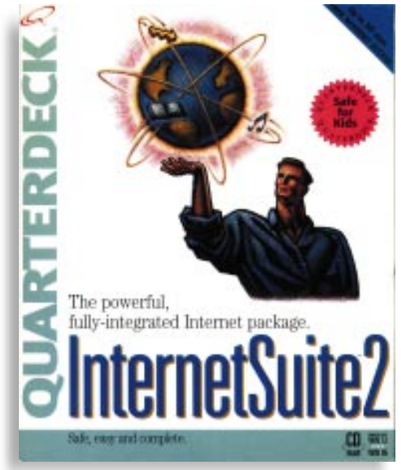
well connected

PJ Fisher examines two leading packages that provide access to all the major services available on the Internet.

COMMSUITE AND InternetSuite are both designed to bring together the major services that the Internet offers, including the Web, FTP, email and newsgroups, into one seamless bundle. Instead of collecting and running many different applications, both take you directly to different parts of the Internet from a single application.

Quarterdeck's offering is strictly an Internet-only tool. Delrina's CommSuite is more expensive but it does more. Not just an Internet tool, it also has fax, voice data and a general comms device.

To use either of these two packages, you are going to need a modem and an Internet account with one of the many service providers ready and eager to part you from your cash.



Delrina CommSuite 95

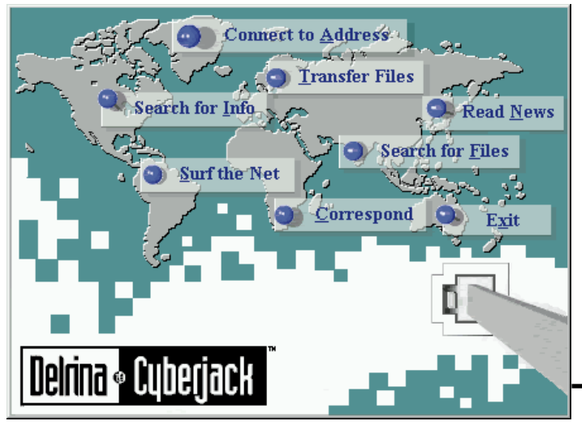
Now part of the Symantec group, Delrina has rewritten its CommSuite as a 32-bit program to take advantage of Windows 95. Make sure you order the CD version, unless you really enjoy installing from 21 floppy disks (tough luck if you don't have a CD drive). You can get by on 8Mb of RAM and a 486 but you would be better off with 16Mb and a Pentium. If you want to use TalkWorks, the voice data package, then you will need a voice-capable modem, too.

Following a typical install, you will have said goodbye to around 64Mb of hard disk space but custom installations are available. Although fully integrated, CommSuite is really four separate packages: WinComm, WinFax, CyberJack and TalkWorks; plus a mini application, CommBar. This is a floating palette which sits on the desktop both as an access point to CommSuite's functions and as a visual reminder of modem or network activity.

CommSuite can connect via the LAN and a leased line but many users will have to configure CommSuite for the modem setup via wizards. CommSuite is fond of wizards and they pop up everywhere. They are useful for the novice but can seem a little over-eager to the more experienced user.

The CompuServe wizard sets up an ISP CompuServe account and is on that 21st disk if you want it — I didn't, thank you very much.

All CommSuite's constituent parts can be accessed from a desktop shortcut confusingly called the GuideBook which duplicates the function of the CommBar. This is unfortunately hidden by applications running at full screen and turns out to be a little tetchy about how it wishes to perform: sometimes it works with all of CommSuite's parts, other times not. CyberJack (the suite within a suite) often failed the CommBar entrance exam.



Cyberjack takes you on a whole tour of the Internet. This is what you see when you first launch this multi-talented application

CyberJack

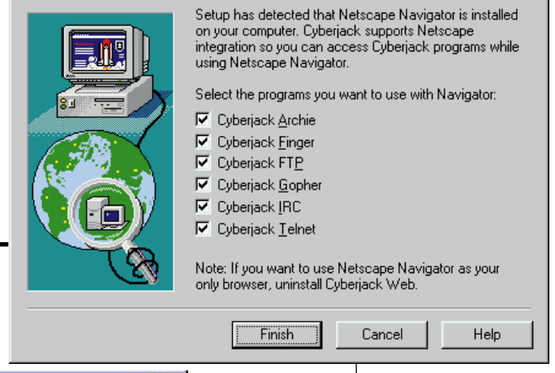
This is an Internet suite all on its own and handles the Web browser, FTP access, email and newsgroup functions.

It's not a great reader, however. You can only choose one newsgroup at a time so you cannot collect a number of items to read off-line and then pick them up at one go. But in use this reminds me of that excellent application Ameol: you double-click on an article to read it in a separate window and reply if you wish.

The mail application is better. It is easy to set up and uses Microsoft Exchange. It's a simple matter of configuring the Exchange for your mail server (consult your ISP for the correct mail server and what kind of protocol it uses) after which, sending and receiving mail is plain sailing. The CommBar will also tell you if mail is being delivered to your account. You can decode multi-part mail and news articles — a useful feature but really no more than you would expect.

The FTP function works equally well and automatically sends anonymous requests and email addresses as passwords to FTP sites. There are a number of FTP sites already listed for you to get started in downloading files. However, it doesn't do anything to relieve the tedium of waiting for FTP files to arrive. FTP works best when you know exactly where files reside and their directory listing, but that comes with experience.

The Web Browser bears a remarkable resemblance to Microsoft's Internet Explorer (both are based on Mosaic), right down to two identical menu buttons. However, unlike Explorer, this browser won't support the more advanced HTML extensions of Java and ShockWave. Whether you miss these depends on how much you value such niceties and whether you have the bandwidth for them anyway. Otherwise, it is a functional enough browser with all the basics such as bookmarks and navigation buttons, and it will read the majority of Web sites.

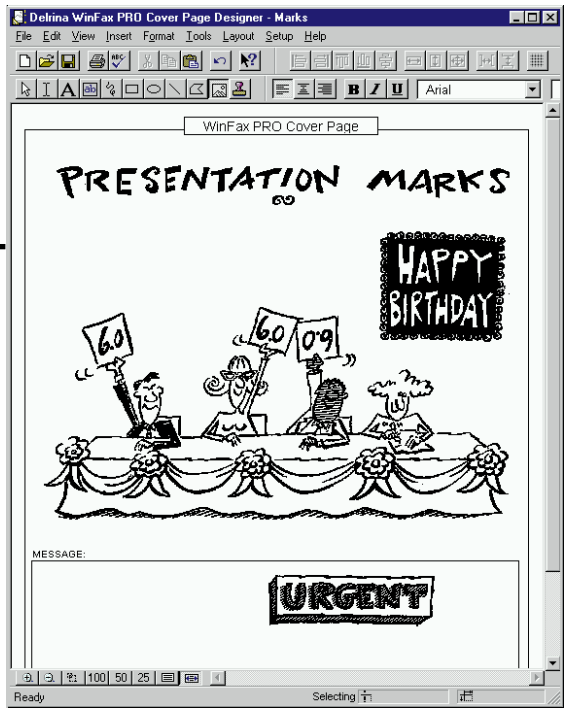


Below *Users of Internet Explorer will feel at home with Delrina's Web browser — no Java or multimedia support, though*

Above *For those who prefer Netscape Navigator, Cyberjack can be configured to work with the world's best browser, too*

Altogether, CyberJack is a useful part of CommSuite and its Mail and FTP functions are extremely well designed. It's a pity that, in contrast to InternetSuite for instance, all functions don't happen within a single window.

Elsewhere, Internet Relay Chat works smoothly as long as you can find someone else with whom to chat. And Finger works well. QuarterDeck's product can match neither of these but they are of minimal importance to many of today's Internet users.



Create the fax from hell with the comprehensive set of design tools found in WinFax

Tools

One outstanding unit among the plethora of tools in this box is the Image Manager that allows you to manipulate images sent or, more likely, downloaded from the Internet. Quite a sophisticated tool it is too, with blur, sharpness, rotation and posterise controls.

Along similar lines is the Zip Manager, a slick little file de-mangler which automatically opens when downloaded .zip files are double clicked; these were decoded without fuss.

A Ping function in all applications allows you to quickly test Internet connections to see if they work. I wish more applications bothered to include this useful device.

WinComm Pro

This is the old-fashioned comms part of CommSuite. It enables dial-up of bulletin boards and remote email systems such as AT&T and MCI.

It is all quite simple to set up and configure but in these Web-dominated days I wonder how many people bother with dial-up services of this type — and US-based email systems are of very limited use to UK users. Nevertheless, if you need it, WinComm Pro is, like the rest of CommSuite, well laid out and easy to use.

WinFax

This, on the other hand, is a widely useful tool especially for small businesses and those working from home. Why buy a fax machine when you can send faxes direct from the desktop? WinFax is one of the best known faxing utilities and deservedly so.

Faxing from the desktop means you can enrich documents with OLE-embedded Word files, Web shortcuts and even .zip files which can all be read on the recipient's PC desktop.

If paper is your bag, WinFax includes numerous options for customising your faxes with pictures, stamps and other decoration. Or you can design a fax — but you might waste hours trying to design a fax when you should, instead, just send it. The OLE shortcuts work, too.

Upgrade patches

A neat feature of CommSuite is the ability to get upgrade patches directly from a BBS as and when they are available, keeping CommSuite constantly up to date. This is a feature other suppliers would do well to emulate. A wizard walks you through the process.

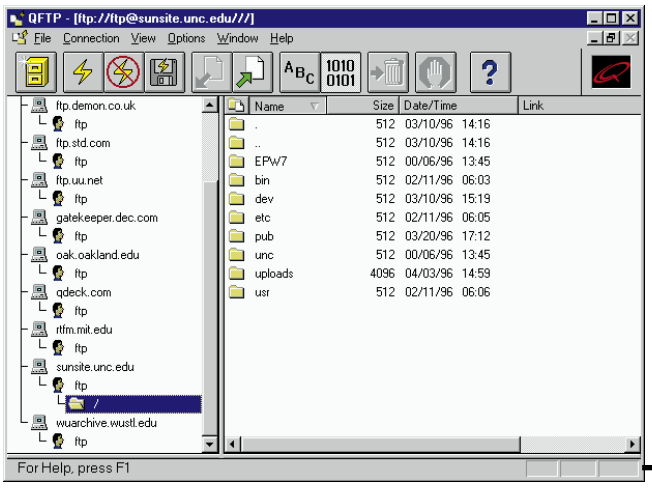
Quarterdeck InternetSuite

No faxing or bulletin boards here, just essential Internet applications. And no 21 disks either. Much to my relief, Quarterdeck supplied the CD-ROM version which installed in seconds. It comes with just two manuals: an installation and Internet connection guide, and the main how-to manual. Both are far less daunting than the library that comes with CommSuite.

Following installation, it's immediately obvious that this is a leaner package — just 10Mb of hard disk space — but at least 8Mb of RAM is still required.

Be careful on install if you already have a working Winsock installed: InternetSuite offers to overwrite and install its own. I would advise against this as nothing gives more trouble to Internet connections on PCs than ill-configured Winsock.dll's. Leave yours alone and Internet Suite should work just fine. The one advantage of using Quarterdeck Winsock is that it provides a network activity window so you know exactly what is happening to your connection.

Once you have got over the Winsock



Above *FTP access is made easy in InternetSuite and the interface is consistent among all the applications*

Left *Quarterdeck's browser is not advanced but the interface and layout make up for that. The directory lists on the left are an outstanding feature*

Quarterdeck has provided four helper applications for the Web which you can install when needed

dilemma it's over to those clever wizards again to configure your Net connection via the LAN or modem. Six programs will then install themselves into the InternetSuite program group: a Web browser, message centre (combined mail and newsreader), FTP, Qterm (a Telnet application), Global Chat, and a Location Manager for setting up an Internet account.

Like Delrina, Quarterdeck has based its browser on Mosaic but it seems archaic. It scores over Delrina's browser by placing all its bookmarks (or hotlists) in a window which is shown next to the Web page currently being displayed. This is a drag-and-drop list and makes it easy to organise favourite Web sites. But in the era of frames, Java and Shockwave, this is still basic stuff.

The design of the browser is cool, though. I like the 3D effect which raises Web pages off the window and the arrow buttons which give the impression of "turning" Web pages. You can assign new icons to Web sites in the hotlist, which can make navigating easier. Somewhat duplicating the functionality of other areas of InternetSuite, you can access newsgroups and email from the browser.

But what about doing it properly? The Quarterdeck Message Centre is designed expressly for both email and newsgroups. This is one of the best parts of InternetSuite: it eases mail and news access while remaining comprehensive. Switch to Message Centre and the same window that contained Web pages and hotlists now comprises mail and news directories on the left and files to be read, opened on the right. This is real integration and one of the reasons InternetSuite is so easy to use.

The toolbar at the top now comprises buttons for sending, composing and replying to mail and news. A complete history of mail and newsgroup activity can be logged in the left-hand window. I like this combination which means that you can work with standard email and newsgroups at the same time. Formatting mail messages is standard and should present no problems, even to new users. And, of course, you can insert .txt files into the message and, *de rigeur* these days, your own sig file.

Newsgroup activity is getting out of control so it pays to carefully select those newsgroups to which you want to subscribe. The first time, there is no way of getting around a full listing (over 12,000) but InternetSuite allows you to choose whichever take your fancy. Subscribe to them and get new feeds when you next log on. These can be ordered into folders that display in the left-hand window.

InternetSuite has no zip utility and instead relies on the Unix Tar format and uuencoding. It's okay but a zip utility, far more common in the PC world, would have been a worthwhile addition.

QFTP and QTerm look after FTP controls and Telnet respectively. You can FTP to more than one site at a time and, once again, the main window comes into play with FTP sites listed on the left and file directories on the right. Selecting and downloading files is simply a matter of clicking on the relevant file and letting InternetSuite do the rest by placing files on your hard disks or on any drive on the LAN. These can be accessed by launching the Windows file manager within InternetSuite's main window — a cool trick which enables the dragging and dropping of files.

If you need to access a remote computer, the Telnet tool has some advanced features such as Interrupt and Abort if running an application on a remote computer is taking too long. In reality Telnet is a nerd's tool, not really used by mainstream Internet users, but it's good to know it's there.

Global Chat allows you to talk to others in real time via the keyboard. I had no problem connecting to chat servers but no-one wanted to talk to me… the story of my life. InternetSuite can also work with Global Chat from Mosaic. If you find an open chat site on the Web, just select Internet Chat and the Global Chat application fires up.

InternetSuite certainly works with Windows 95 but doesn't look as though it has been redesigned for it. Many of the windows still have that 3.1.1 look to them and the manual itself doesn't refer to Windows 95 at all. Strange.

Conclusion

I liked both these packages and cannot fairly judge either as the best, especially given the price difference. If you want fax, talk and comms capabilities, go for CommSuite. Delrina has left nothing out and created an intelligible package which will get even newbies traversing the Net with ease. It is well integrated and apart from one or two glitches with the CommBar (which is hardly indispensable) everything worked fine. It is a well thought out package and considering how much you get, a good value one.

If you don't need all that, or simply can't afford CommSuite, Quarterdeck's product makes good sense. It is even better integrated than CommSuite, well designed and does all it promises. It is let down by an archaic browser but even that is alleviated by the hotlist directory in the left-hand window. It will even help you connect to your ISP, a task which many people find daunting. For a reasonable price it offers more than enough for most Internet users.

These are two fine Internet packages that advance the cause of making the Internet available to everyone. Just improve those browsers.

PCW Details

Delrina CommSuite 95
Price £129 (plus VAT)
Contact Delrina 01628 592320

Quarterdeck InternetSuite
Price £59.95 (plus VAT), includes 30-day free Internet access with Easynet offer
Contact Quarterdeck International 01245 496699

Café society

It's into The Greasy Spoon and on to the beans on toast as Stephen Wells uses a café setting to demonstrate Excel 7's analysis abilities.

Imagine you've been invited to join the board of a national chain of cafés serving traditional English cuisine. Among other things provided at your initial briefing is a temporary password to the company's database covering a representative week — the first in April. Before you give them your decision you obviously will visit some of the facilities, but you also decide to do a little analysis of the sample week using the built-in features of Excel 7.

Let's call the chain The Greasy Spoon. It has six locations in shopping malls. There are six entrées served and these are the only items, as other concessions, sharing the same snack area seating, offer beverages and desserts. The cafés are open the same hours as the malls except they're closed on Sundays, so there are six days of results.

If the company happens to use Access 7 for its database then you just select any report: there's a drop-down selection of export options and you can select Analyze it with MS Excel, *Fig 1*. That will open an Excel worksheet and feed the data onto it. If not, no problem. Just choose Data, Get External Data and Microsoft Query will open offering a Select Data Source dialogue box in which you can search for databases in a variety of formats including Paradox, FoxPro, dBase and text. Other ODBC (Open Database Connectivity) drivers are available from Microsoft.

When you install Microsoft Query with Microsoft Excel, you install two different programs: the Microsoft Query add-in and the Microsoft Query application. The add-in acts as a bridge between Excel and the application. It places the Get External Data command on the Data menu. This command starts the Microsoft Query application so you can select how you want to return data to the worksheet.

You can filter data that is too large to fit on a Microsoft Excel worksheet. You can also join two or more separate tables of data based on specific criteria; retain the order of data after updating results; and repeat queries for weekly, monthly, or quarterly reports. You can also import data stored in file formats that Excel cannot open as a worksheet.

Fig 1

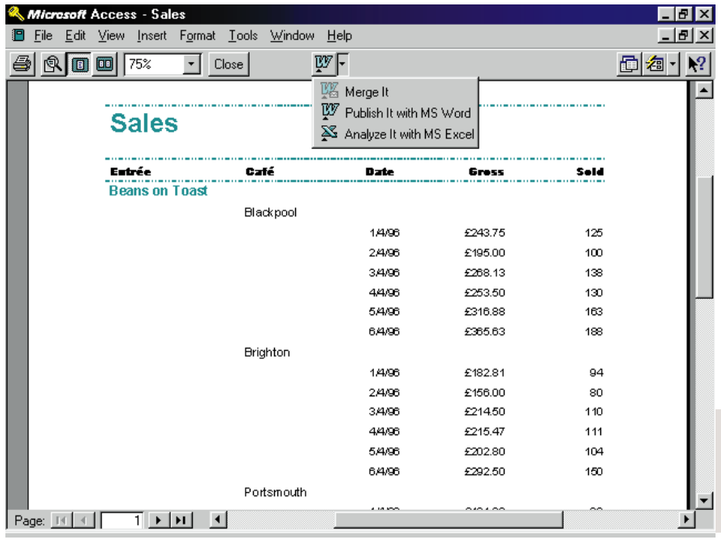


Fig 1 *Microsoft Access 7 offers a button to automatically create an Excel 7 worksheet and export an Access report to it*

Automatic summaries

Quite similarly to the way a Contents page will encapsulate all the information in a book, Excel will automatically create an outline of a worksheet which can be instantly expanded or collapsed.

Sort your data. Then choose Data, Subtotals and the used area of your worksheet is automatically selected and a dialogue box offered, *Fig 2*. You can pick from drop-down lists the category to be summarised (here by Café), the function to be used (Sum), and the fields where the subtotals should be added (Sold and Gross).

The resultant display, *Fig 3*, immediately shows the subtotals for each café. The Grand Total is at the top because we didn't check the "Summary Below Data" box.

At top left there are three new buttons. 1 removes everything except the Grand Total. 2 gives a list of all the subtotals and no detail. 3 gives the detail with interlaced subtotals, as here.

To the left of the row numbers are added minus marks. Click the one opposite row 3 and Blackpool's details will disappear, leaving just the subtotal. The minus becomes a plus. Click the plus and the details reappear. For each minus sign there is a bracket which embraces the rows which will disappear.

This outlining procedure lets you switch from summaries to full details at a click.

Projecting different strategies

From The Greasy Spoon's database we have already extracted the turnover for each café for each day of the first week in April. We can also look up new data like the weekly cost of running each café and the amounts spent on advertising. We can total the number of meals sold and can calculate the average price of a meal.

We can carry these to a new sheet in our workbook like *Fig 4*. The actual average meal price and cost are in the box at the foot of the table. Actual results are shown in bold in rows 4 and 6. Although we will be examining the potential results of new policies here, it is useful to keep this example of a representative week in front us.

Row 2 carries a weighting to allow for difference in locations. Row 5 displays a forecast of the total number of meals to be sold by each café. Each cell contains the formula:

```
=110*B2*(B12+500)^0.5
```

where, in column B, B2 is the weighting factor and B12 is the cost of media advertising. It assumes that advertising will lift sales above a base figure, but with diminishing returns. For the sake of this tutorial it can be any comparable formula

Fig 2

	A	B	C	D	E	F	G
1	Date	Entrée	Sold	Price	Gross	Café	
2	1/4/96	Beans on Toast	125	1.95	243.75	Blackpool	
3	1/4/96	Egg and Chips	98				
4	1/4/96	Fish and Chips	200				
5	1/4/96	Jellied Eels	45				
6	1/4/96	Shepherds Pie	101				
7	1/4/96	Toad in the Hole	84				
8	1/4/96	Beans on Toast	94				
9	1/4/96	Egg and Chips	74				
10	1/4/96	Fish and Chips	150				
11	1/4/96	Jellied Eels	34				
12	1/4/96	Shepherds Pie	76				
13	1/4/96	Toad in the Hole	63				
14	1/4/96	Beans on Toast	63				
15	1/4/96	Egg and Chips	49				
16	1/4/96	Fish and Chips	100				
17	1/4/96	Jellied Eels	23				
18	1/4/96	Shepherds Pie	51				

Subtotal

At Each Change in: Café

Use Function: Sum

Add Subtotal to: Sold, Price, Gross

Replace Current Subtotals
Page Break Between Groups
Summary Below Data

OK
Cancel
Remove All

Contents Prices Sales Pivot Summaries Transport Invoice Sheet8 Sheet9 Sheet10

Fig 2 *The report of daily sales for each item for each café, imported from a company database*

Fig 3

1 2 3		A	B	C	D	E	F
	1	Date	Entrée	Sold	Price	Gross	Café
	2			18844		51,194.78	Grand Total
	3			653		1,774.05	Blackpool Total
	4	1/4/96	Beans on Toast	125	1.95	243.75	Blackpool
	5	1/4/96	Egg and Chips	98	2.25	220.50	Blackpool
	6	1/4/96	Fish and Chips	200	2.95	590.00	Blackpool
	7	1/4/96	Jellied Eels	45	2.45	110.25	Blackpool
	8	1/4/96	Shepherds Pie	101	2.75	277.75	Blackpool
	9	1/4/96	Toad in the Hole	84	3.95	331.80	Blackpool
	10			490		1,330.54	Brighton Total
	11	1/4/96	Beans on Toast	94	1.95	182.81	Brighton
	12	1/4/96	Egg and Chips	74	2.25	165.38	Brighton
	13	1/4/96	Fish and Chips	150	2.95	442.50	Brighton
	14	1/4/96	Jellied Eels	34	2.45	82.69	Brighton
	15	1/4/96	Shepherds Pie	76	2.75	208.31	Brighton
	16	1/4/96	Toad in the Hole	63	3.95	248.85	Brighton
	17			327		887.03	Portsmouth Total
	18	1/4/96	Beans on Toast	63	1.95	121.88	Portsmouth

Contents Prices Sales Pivot Summaries Transport Invoice Sheet8 Sheet9 Sheet

Fig 3 *The results of the entries in the Subtotal dialogue box. Each café's details can be displayed or summarised*

Fig 4

	A	B	C	D	E	F	G	H
1	Weekly	Blackpool	Brighton	Portsmouth	Scarborough	Skegness	Southend	Totals
2	Local weighting	0.9	0.8	0.8	0.6	0.7	0.8	
3								
4	Actual No. Meals	4,405	3,393	2,778	2,414	2,601	3,253	18,844
5	Projected No. Meals	4,950	3,408	2,919	2,469	2,776	3,293	19,815
6	Actual Turnover	£ 11,968	£ 9,218	£ 7,547	£ 6,559	£ 7,067	£ 8,837	£ 51,195
7	Projected Turnover	£ 13,464	£ 9,270	£ 7,939	£ 6,717	£ 7,551	£ 8,956	£ 53,898
8	Cost of Sales	6,732	4,635	3,969	3,359	3,776	4,478	26,949
9	Gross Margin	£ 6,732	£ 4,635	£ 3,969	£ 3,359	£ 3,776	£ 4,478	£ 26,949
10								
11	Café overhead	2,300	2,100	1,900	1,400	1,500	2,000	11,200
12	Advertising	2,000	1,000	600	900	800	900	6,200
13	Company Overhead	1,750	1,205	1,032	873	982	1,164	7,007
14	Total Costs	£ 6,050	£ 4,305	£ 3,532	£ 3,173	£ 3,282	£ 4,064	£ 24,407
15								
16	Profit	£ 682	£ 330	£ 437	£ 185	£ 494	£ 414	£ 2,542
17	Profit Margin	5.06%	3.56%	5.51%	2.76%	6.54%	4.62%	4.72%
18								
19	Ave. Meal Price	£ 2.72						
20	Ave. Meal Cost	£ 1.36						

Fig 4 *Calculating the average cost of a meal*

which is meaningfully related to other specific cells in the column.

The projected turnover in row 7 is the average price of meals ($B$19) times this number of meals (B5 in column B). The Cost of Sales in row 8 is the average meal cost ($B$20) times the number of meals (B5).

The Gross Margin (B9) is the Project Turnover (B7) minus the Cost of Sales (B8). The entries for each café's overhead and advertising allocations on rows 11 and 12 are entered and not calculated.

The share of Company Overhead, row 13, is 13% of each café's projected turnover (B7*0.13). Total Costs, row 14, are the sum of rows 11 to 13. Profit, row 16, is Gross Margin minus Total Costs (B9-B14). The Profit Margin is Profit divided by Turnover (B16/B7) formatted

Another point of view

A PivotTable is the most powerful data analysis tool available in Excel. It allows you to quickly answer any question which can reasonably be asked within the parameters of the available data.

Step 1 is the database of sales on an Excel worksheet. It shows the total number of each entrée sold, each day, at each café. On April 1st, for example, the Blackpool outlet grossed £243.75 from selling 125 portions of Beans on Toast. Column D looks up the price of each meal on another sheet in the workbook. Column E calculates the total sales of that meal (=C2*D2).

To make the PivotTable you just choose Data, PivotTable and the PivotTable Wizard starts. Step 1 offers you a choice of sources to use. Assuming you take the default, "Excel list or database", Step 2 displays the range of your current worksheet and gives you the option to change the range covered. The illustration shows Step 3. You simply drag the fields, or column headings, displayed on the right into the designated areas on the left. Here the overall heading is Café with each row a different date, each column a different entrée and the gross sales figures given in the data table. Step 4 just lets you enter, or point to, the cell of the worksheet where the PivotTable is to start.

Step 3 is the result. All the displayed data here is about one café. Although Blackpool is shown, there is an arrow to drop down a choice of all the other cafés. The dates from the worksheet's column A are now labelling the rows as requested. The entrées from column B become the labels for the columns. The facts are the same. The Blackpool café still grossed £243.75 from sales of Beans on Toast on April 1st. And we can see the gross sales on that day of all the different meals of that location.

The beauty of a pivot table is that you can view the information so many different ways quickly and easily. You don't even have to go back to the PivotTable Wizard to do it. In *Step 4* we've simply dragged the Date label up to the page heading position, "Café" down to the column headings position, and "Entrée" to the row label position. Now for each selected date you can see the sales of each meal at each café. You also have many options on the data table. Choose Data, PivotTable Field, Options, Show Data As..., and you can see the percentage of gross sales made by each meal in each café. You could as easily see the percentage of all sales of one entrée made by each café (% of row). You can also still use the sort ascending and descending buttons on the Standard Toolbar to see the best and worst income producers at each café.

Step 1

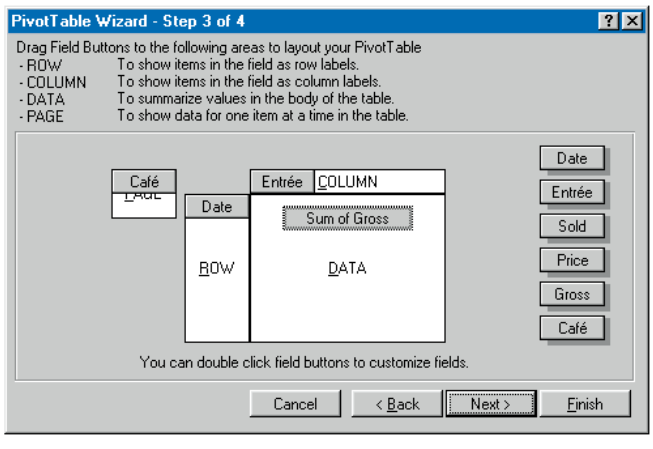
Microsoft Excel - The Greasy Spoon database.xls

File Edit View Insert Format Tools Data Window Help

D2 =VLOOKUP(B2,Price_List,2)

	A	B	C	D	E	F
1	Date	Entrée	Sold	Price	Gross	Café
2	1/4/96	Beans on Toast	125	1.95	243.75	Blackpool
3	1/4/96	Egg and Chips	98	2.25	220.50	Blackpool
4	1/4/96	Fish and Chips	200	2.95	590.00	Blackpool
5	1/4/96	Jellied Eels	45	2.45	110.25	Blackpool

Step 2



Step 3

Café Blackpool

Sum of Gross	Entrée						
Date	Beans on Toast	Egg and Chips	Fish and Chips	Jellied Eels	Shepherds Pie	Toad in the Hole	Grand Total
1/4/96	243.75	220.50	590.00	110.25	277.75	331.80	1,774.05
2/4/96	195.00	176.40	472.00	88.20	222.20	265.44	1,419.24
3/4/96	268.13	242.55	649.00	121.28	305.53	364.98	1,951.46
4/4/96	253.50	231.75	604.75	122.50	291.50	351.55	1,855.55
5/4/96	316.88	286.65	767.00	143.33	361.08	431.34	2,306.27
6/4/96	365.63	330.75	885.00	165.38	416.63	497.70	2,661.08
Grand Total	£1,642.88	£1,488.60	£3,967.75	£750.93	£1,874.68	£2,242.81	£11,967.64

Step 4

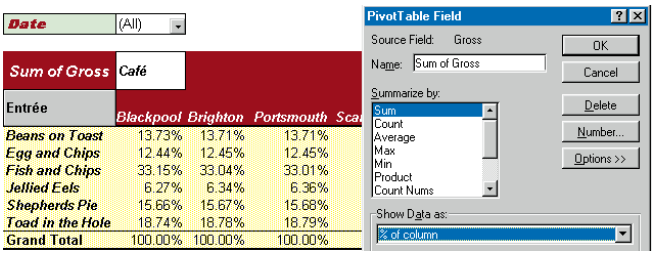


Fig 5

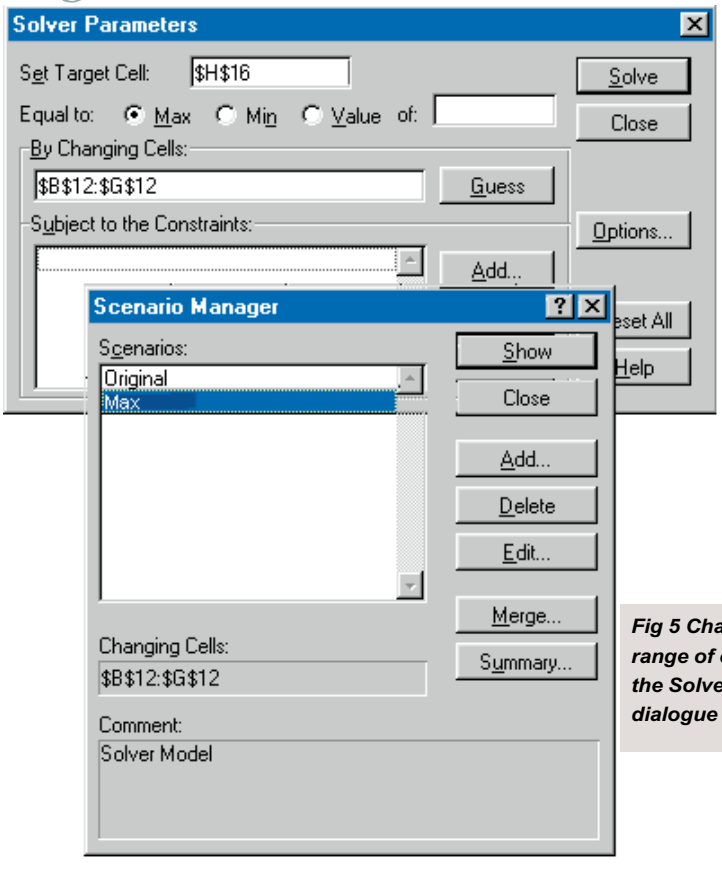


Fig 5 Changing the range of cells in the Solver dialogue box

as a percentage.

We can try out some what-if situations on this model as it stands. But rather than fiddle around experimenting with different manual entries, a better way is to tell Excel what you're trying to achieve and let it try out all the variations until the optimum solution is reached.

As it stands, the profit margin of the model is 4.72% of Projected Turnover (H17). The question we can ask is: Based on a different appropriation for advertising, how can we maximise the profit?

If only one variable were involved we could choose Tools, Goal Seek. It offers a dialogue box which helps you set one cell to one value by changing one other cell. But we need to change a range of cells.

Choose Tools, Solver and specify the parameters of the query in the Solver dialogue box, *Fig 5*. The target cell is H16, the weekly profit for the chain. We have a choice of finding the Maximum, Minimum or a specific Value. We select Maximum. The primary range we want to change is that for advertising, B12:G12. Click Solve and Excel comes up with a solution.

By choosing Tools, Scenario and displaying the second dialog box in *Fig 5*, we can retain both versions and switch back and forth to compare them. A Scenario is simply another version of an existing worksheet.

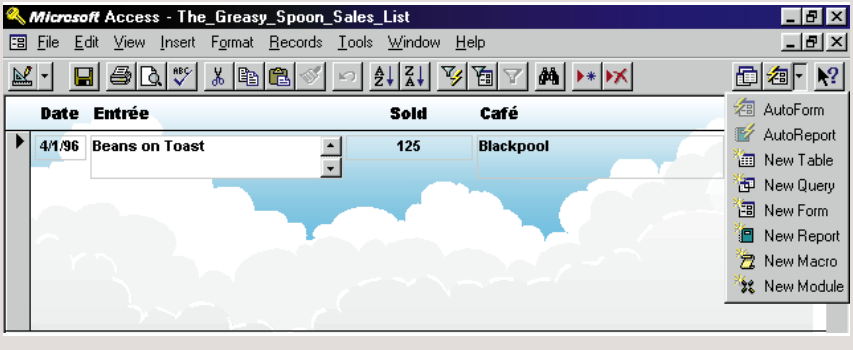
The new version increases the overall amount for advertising but not evenly: four of the cafés have their ad budgets increased, Blackpool and Scarborough have theirs reduced. The amount of overall profit increases by 9%, from £2,542 a week to £2,769 (although the profit margin on the new turnover reduces insignificantly from 4.72% to 4.67%).

Every category on the worksheet except the fixed figures for café overheads changes. So, the expected new turnovers in revenue and numbers of meals for each café are given, as well as the profit for each café.

In the first two parts of this Excel tutorial I've illustrated some of the most significant features of Version 7. There are over 200 built-in functions and almost as many again available through the add-ins supplied with Excel, so although improvements continue to be made to Visual Basic for Applications (VBA) it is now quite realistic for developers to create powerful individual applications without writing any code. And it is advantageous to do so: functions executed through the new Excel built-in calculation engine run faster than similar routines written in VBA.

• *Next month, we'll look at the presentation features of Excel 7.*

Making a Data Form



Once you have transferred a segment of a database to an Excel worksheet, you can create a form for making additions to it. If you have the full Office 95, you can choose Data, Access Form and a Wizard starts to help you create it. Actually, this is a shortcut to the Access Wizard and you create an Access form with a wide choice of decorative backgrounds like the clouds above.

The Wizard automatically adds a button on the database list for displaying the form. On selecting a data entry box, an arrow will appear, offering a drop-down list of appropriate entries to pick from.

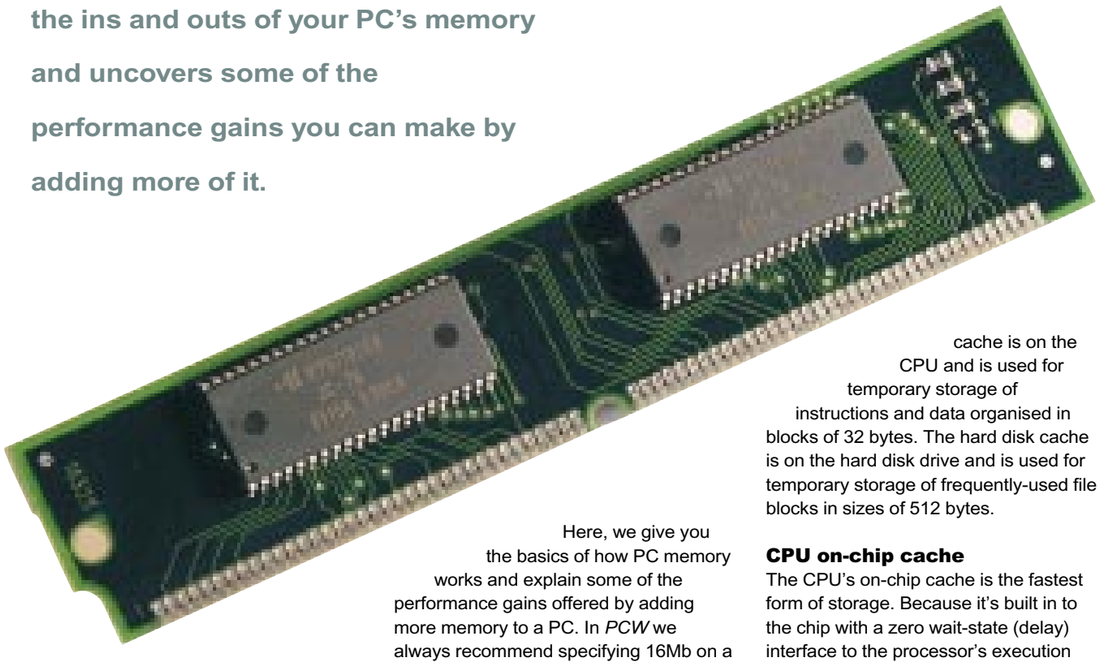
Of course, as with earlier versions, Excel 7 still offers you a simple automatic data entry form by choosing Data, Form. A dialogue box appears which includes all of the named fields and spaces for making new entries. Results of calculated fields for existing or new entries are provided. It looks more utilitarian than the Access form, but does the job.

PCW Contacts

Stephen Wells welcomes comments and suggestions via *PCW Editorial* at the usual address or at **Stephen__Wells@msn.com**

Aide memoire

Memory man Thomas Leyrer explains the ins and outs of your PC's memory and uncovers some of the performance gains you can make by adding more of it.



MEMORY IN PCs IS A CONFUSING business. Novices often confuse disk space with RAM but even experienced PC users have been known to confuse processor cache with disk cache.

Here, we give you the basics of how PC memory works and explain some of the performance gains offered by adding more memory to a PC. In *PCW* we always recommend specifying 16Mb on a PC to ensure acceptable performance — now you can find out why.

The PC storage pyramid

On a fully-configured PC the programs and data are used on four storage levels. *Table 1* illustrates the four basic storage levels, with their main characteristics, for a typical PC system. The processor cache is on the CPU and is used for temporary storage of instructions and data organised in blocks of 32 bytes. The hard disk cache is on the hard disk drive and is used for temporary storage of frequently-used file blocks in sizes of 512 bytes.

CPU on-chip cache

The CPU's on-chip cache is the fastest form of storage. Because it's built in to the chip with a zero wait-state (delay) interface to the processor's execution unit, it is limited in size and is typically 16Kb. The control logic of the on-chip or first-level cache keeps the most frequently used data and code in the cache and updates external memory only when the CPU hands over control to other bus masters, or during direct memory access by peripherals such as floppy drives and sound cards.

Table 1 PC storage pyramid with key features

Storage	Bus Speed	Bus Width	Size	Access Time	Transfer Rate
CPU on-chip cache	75 — 200MHz	32 Bits	8 — 16Kb	5 — 10ns	300 — 666Mb/sec
External cache	33 — 66MHz	32, 64 Bits	256Kb — 1Mb	15ns	133 — 528Mb/sec
Main memory	33 — 66MHz	32, 64 Bits	8 — 256Mb	60ns	66 — 264Mb/sec
Hard disk	8 — 33MHz	16, 32 Bits	500Mb — 4Gb	10 — 20ns	1 — 8Mb/sec

A burst cycle consists of four data transfers where only the address of the first 64 bits (32 bits on a 486 processor) are output on the address bus.

Specialised SRAM technology has been developed to achieve zero wait-state access for consecutive burst read cycles. These pipelined-burst modules allow a transfer timing of:

- 3-1-1-1 cycles for the first burst cycle; and
- 1-1-1-1 cycles for consecutive burst reads.

These numbers refer to the number of clock cycles for each access of a burst mode memory read.

For example, 3-1-1-1 refers to three clock cycles for the first word and one cycle for each subsequent word.

A cheaper solution for second-level cache is to use asynchronous SRAM. With this type of memory, all burst read cycles have a timing of 3-2-2-2 on a 50 to 66MHz CPU bus, which means that there are two wait-states for the lead-off cycle and one wait-state for the following three transfers of the burst cycle.

External or second-level cache (SRAM)

The same control logic is used for the external cache or second-level cache. Typical size for this storage level is 256Kb. The medium used for the external cache is SRAM.

The aim of the second-level cache is to supply stored information to the processor without any delay (wait-state). For this purpose, the bus interface of the processor, which runs at speeds of up to 66MHz, has a special transfer protocol called burst mode.

Main memory (DRAM)

Going another step down the PC storage pyramid is the main memory, which is normally built up from DRAM devices soldered on to a 72-pin SIMM module.

The four sockets on a typical PC motherboard allow main memory sizes of up to 256Mb. Compared to 16Kb of first-level cache and 256Kb of second-level cache, the main memory is by far the biggest portion of silicon storage in a PC system. Thus, it is very important that the transfer cycles between DRAM and CPU are as fast as possible.

The DRAM controller in the system logic (chipset) is responsible for the timing and control of the SIMM modules

In general, first and second-level caches contain the most frequently used code and data from the main memory. Therefore, the storage capacity is not enlarged by the addition of cache memory. Cache is used in order to enhance access speed only.

The DRAM interface uses the same burst protocol as the external cache controller. With standard DRAM or Fast-Page-Mode DRAM, a typical burst timing of 7-3-3-3 for a 50MHz bus can be achieved. In this case, the lead-off cycle contains six wait-states, which significantly decreases the performance.

An enhancement of the Fast-Page-Mode DRAM is EDO (extended data out) memory. At the same bus speed, this memory saves one wait-state on subsequent data transfers, with a typical burst timing of 7-2-2-2. As CPU bus

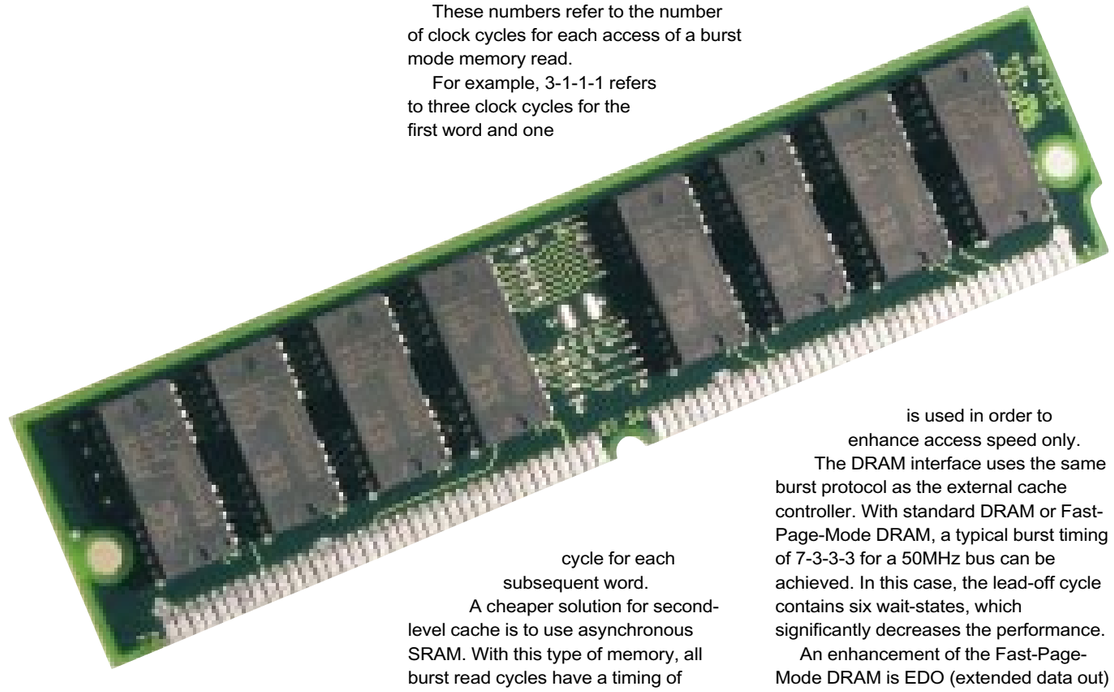
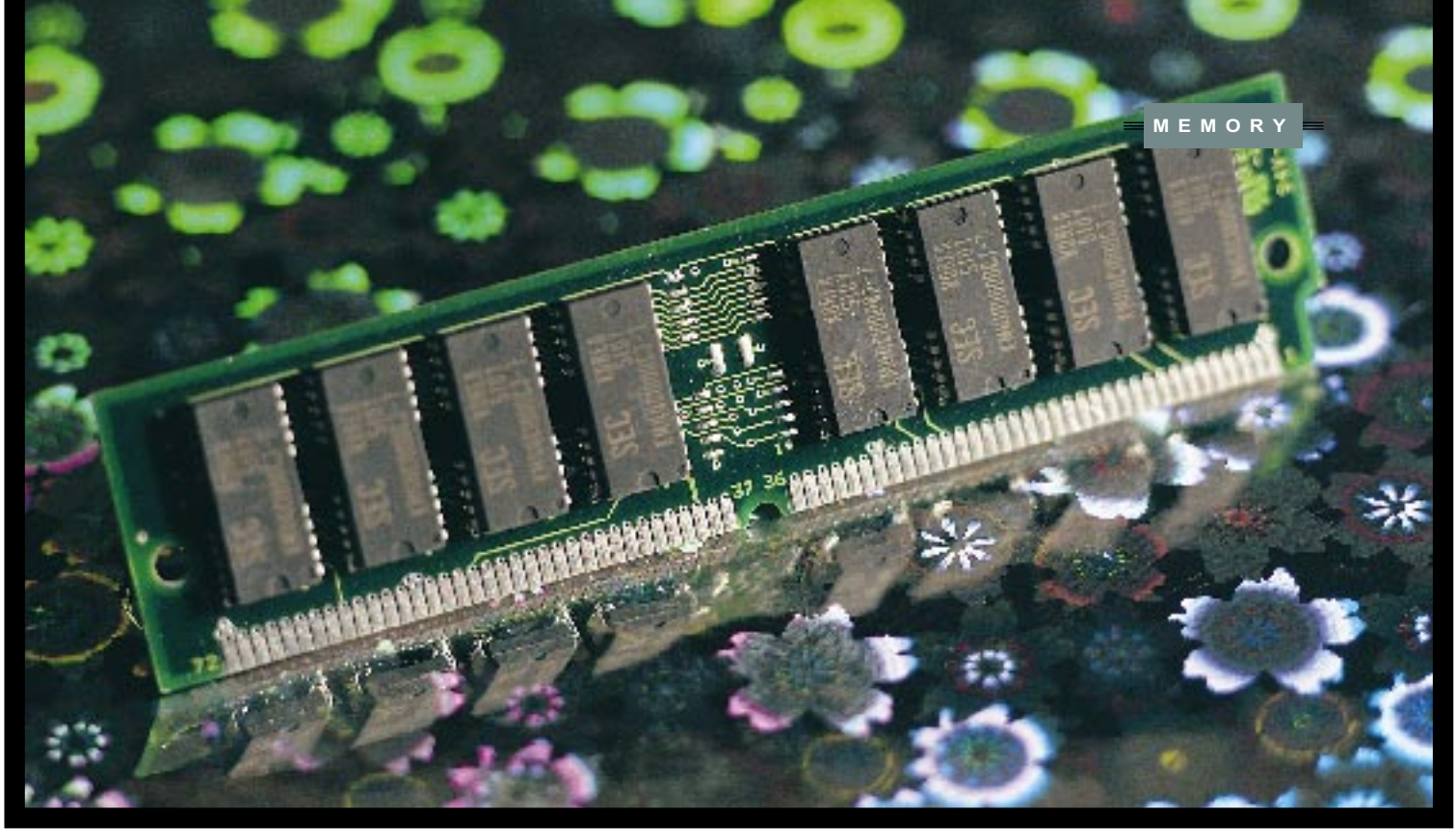


Table 2 Burst-timings for a Pentium processor

External Memory	Burst-Timing
Second Level Cache (SRAM)	
Pipelined Burst Cache	3 - 1 - 1 - 1
Asynchronous Cache	3 - 2 - 2 - 2
Main Memory (DRAM)	
Fast Page Mode DRAM	7 - 3 - 3 - 3
Extended Data Out DRAM	7 - 2 - 2 - 2



frequency moves up, synchronous DRAMs will be used to keep pace with the processors of the future.

In order to get performance benefits from EDO memory, the system must support it with the chipset and the BIOS (basic input/output system). Essentially, speed enhancement depends on the type of chipset, the speed of the processor bus and the speed of the EDO memory. Systems without external cache can be accelerated by ten percent using EDOs. On systems with external cache, the system performance increases by a maximum of five percent.

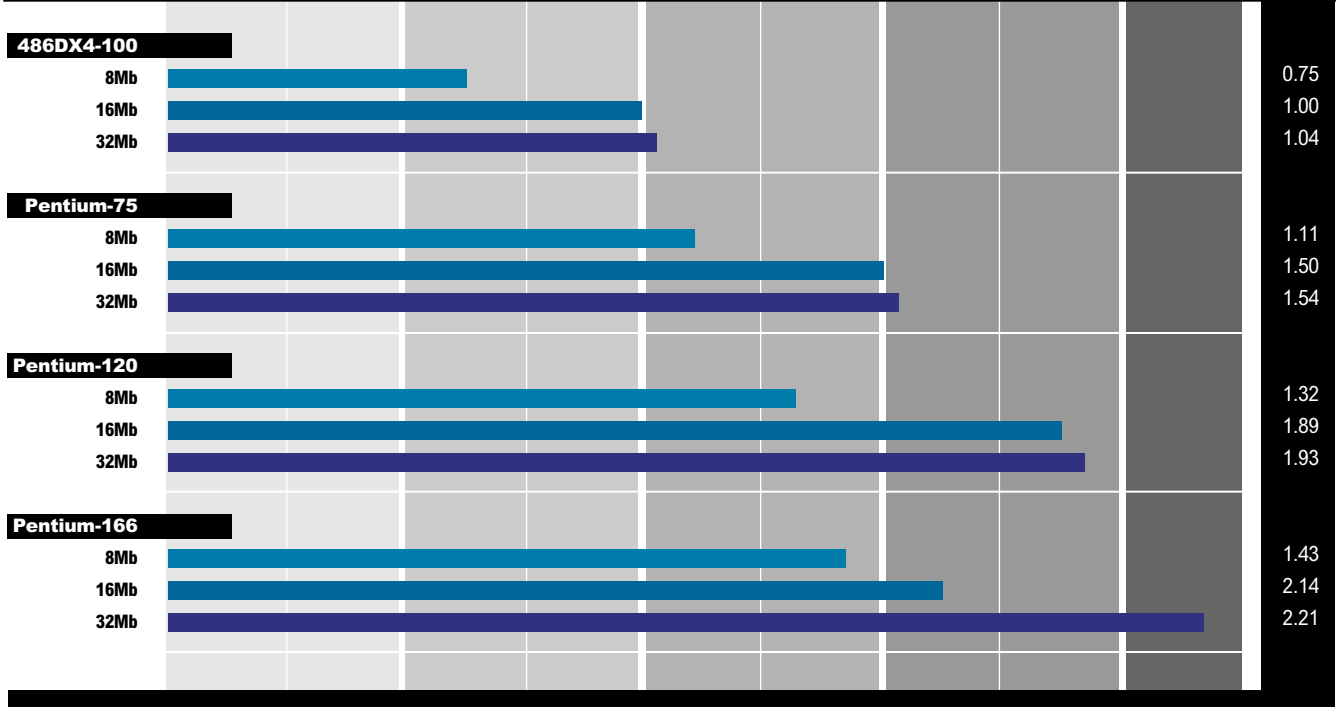
Some parts of main memory are also used as a virtual cache for the hard disk, the CD-ROM, the file system and the printer. The virtual cache can take up to a quarter of the main memory. *Table 2 (page 173)* summarises the various burst timings based on a processor bus speed of 50 - 66MHz.

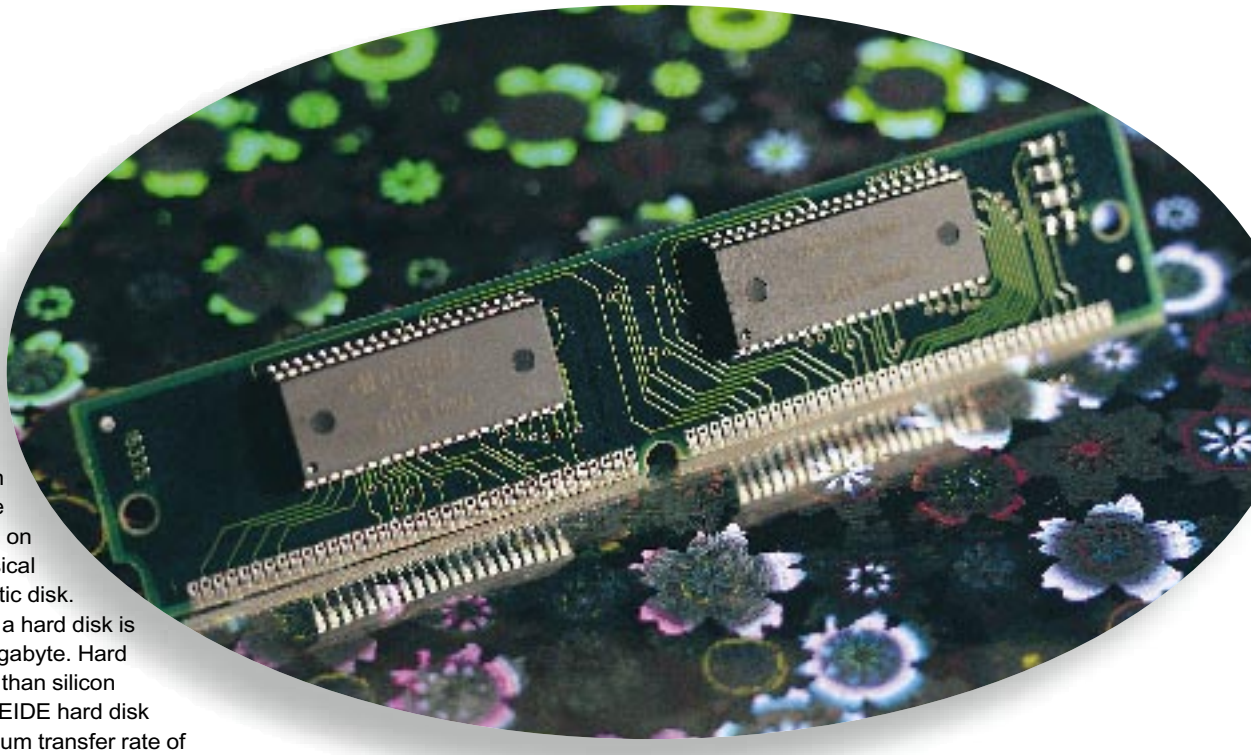
Hard disk

The last storage level is used to load application software into main memory

Memory Results

Using VNU application-based labs tests. These figures indicate only broad trends because components, such as graphics cards, hard disks and cache memory, impact performance.





for execution and to store information after processing by the application program.

The hard disk is a mechanical device and is therefore much slower to access. The transfer rate depends on the speed of the physical rotation of the magnetic disk.

The typical size of a hard disk is in the range of one gigabyte. Hard disks are a lot slower than silicon memory. The fastest EIDE hard disk drives reach a maximum transfer rate of 13.8Mb/sec by using a 32-bit bus width. Standard 16-bit IDE controllers limit the transfer rate to 5Mb/sec, although the latest UltraSCSI standard offers a transfer rate of up to 40Mb/sec.

Because main memory is limited in PC systems, operating systems like Windows 95, or Windows 3.11, use swap files to "virtually" enlarge the main memory. The advantage of this technique is that the operating system can administer memory ranges above main memory without using more silicon — it uses the hard disk instead. The drawback of this technique is the far slower access time and transfer rate of the hard disk, so the fast CPU does not benefit if the program is executed from the hard disk.

How much memory do I need?

You can split PC users into three broad categories based on the amount of time they spend working on a PC and the application software they use.

The first group spends less than three hours a day in front of their PC and includes small offices and home users.

The next category includes office users in companies, using a networked PC all day with standard applications.

Finally, there are professional users and programmers who really challenge their system with memory and graphics-intensive tasks.

For the first type of users, 16Mb of main memory is perfectly acceptable. Although PCs running Windows 95 will work with 8Mb, it doesn't make sense if any kind of multitasking operation is required, as the high-speed CPU has to wait for the much slower hard disk. For Windows NT-based PCs a minimum of 32Mb is recommended, because the operating system requires at least 12Mb without any applications loaded. Just a single application under Windows NT reaches the 16Mb boundary of the main memory.

A single application will run reasonably well under Windows 95 with 8Mb of memory. We ran our NSTL application tests with a selection of different processors using different memory configurations.

In all cases performance was acceptable with 8Mb of memory, but improved (sometimes drastically) by upgrading to 16Mb of RAM. For example, a Pentium 75Mz with 16Mb of RAM outperforms a P166 with 8Mb of RAM.

However, single tasking is no longer the standard scenario under Windows 95. Often, five or six applications are run simultaneously. Although we do not yet have NSTL benchmarks for multitasked applications, there a couple of ways to look at how much your PC's performance is constricted by memory.

The simplest method is to look for hard disk activity either by listening for it or looking at the hard disk indicator light fitted to most PCs. Switching between applications using the Alt-tab key or by cutting and pasting from the clipboard will show up use of virtual memory.

A second, and more precise, method is to use the System Monitor utility supplied with Windows 95 and display usage of the swapfile. A default installation of Win95 does not install it so you'll need to go to the Add/Remove-Programs icon in the Control panel to do so. Windows NT offers a more sophisticated Performance Monitor which

Unified Memory Architecture

In order to cut system costs, a new memory architecture has been developed. The Unified Memory Architecture (UMA) shares the same chips for video memory and main memory in a PC.

The main memory contains the topical program and data for execution and processing, while the video memory is a window within the main memory to display information on the monitor. The video memory resides on the graphics adaptor and varies in size depending on the resolution and colour depth.

By sharing the same chips, this allows you to save the costs for the video memory. The trade-off with UMA is a slower access to the memory due to the arbitration overhead and the fact that you are losing between one and 2Mb of main memory. Thus, it is not recommended to use UMA on machines with less than 16Mb of main memory.

can be found under Administrative Tools. Here the paging file is the virtual extension of the main memory.

The system monitor can be used to monitor the size of the swapfile over a period of time. Replacing an 8Mb swap file with the same amount of main memory has a drastic effect on performance: over 20 percent on a DX4-100 and as much as 50 percent on a Pentium 166MHz. When multitasking, a DX4-100 with 16Mb of RAM will outperform a Pentium with 8Mb of RAM.

Adding memory

There are several ways to add main memory to your PC. In general, the motherboard offers four SIMM sockets which will take single-sided or double-sided SIMMs with module sizes of 4, 8, 16, 32 or even 64Mb. As the Pentium processor has a 64-bit external data bus, two modules of the same size are required as a minimum configuration.

When you buy a new system, be sure that only two memory sockets are occupied. This leaves you with the possibility to upgrade the memory without throwing away the existing modules. It is not advisable to use motherboards which allow the use of only one memory module. These platforms have significantly less memory throughput which lowers system performance. There is more granularity on 486-based platforms in terms of memory upgrade because full memory bus width is reached with one module.

The future of personal computing is in improving the man-machine interface. Applications such as video communication, speech recognition and handwriting recognition enter a new level of hardware requirements for PCs. These applications require massive parallel execution of digital signal processing tasks which cannot be handled by the fastest x86 processor available today. These processors do not have an architecture optimised for digital signal processing and a dedicated DSP device is far more efficient. In terms of main memory, future applications (as already mentioned) can use the same memory with typical sizes between 32 and 256Mb.

The price of the fastest Pentium chip, a 17in monitor and 32Mb of main memory are almost identical. Price reductions of the main memory and the monitor are historically slower compared with the price drop of the processor. It makes far more sense to buy the right amount of memory and a good monitor in the first place, than to run the fastest Pentium processor available, constrained by inadequate memory.

It can be concluded that the best price/performance ratio in PCs today is obtained by optimising the memory rather than by increasing the speed of the processor, especially when taking account of new multitasking operating systems such as Windows 95, Windows NT and OS/2 Warp.

Glossary of terms

Cache	A buffer of high-speed memory filled at medium speed from main memory. A cache increases memory transfer rates and system performance.
DRAM	Dynamic Random Access Memory — Volatile memory chips that use capacitors to store information as an electric charge. DRAM chips offer high density at a low cost, but they must be frequently refreshed.
DSP	Digital Signal Processor — A computer, orientated towards maths-intensive applications; often a single chip or small chipset.
EIDE	Enhanced Integrated Drive Electronics — Hard disk drive compatible with register sets and transfer modes of EIDE standard.
FPM DRAM	Fast Page Mode DRAM — DRAM with faster data transfers within certain memory blocks (pages).
LED	Light Emitting Diode — Illuminated dot often used to indicate device operation.
MPEG	Moving Picture Experts Group — A standard for digital video and audio compression.
PCI	Peripheral Component Interconnect — Graphics adaptor using CPU local bus standard for fast data transfers.
SIMM	Single In-line Memory Module — A small circuit designed to accommodate surface-mount memory chips. SIMMs use less board space and are more compact than more conventional memory-mounting hardware.
SRAM	Static Random Access Memory — A high-performance storage medium that does not require refresh. Asynchronous SRAM is SRAM which runs not in phase with CPU clock. Asynchronous SRAM is slower than synchronous SRAM.
UMA	Unified Memory Architecture — Standard for using main memory as video memory on entry-level PCs.

SIMM sense

Most SIMMS are compatible with others, whether they are from a PC, a Mac, a mainframe or even a laser printer (although there are some oddities knocking around). The three issues affecting compatibility are speed, parity and number of pins (data width).

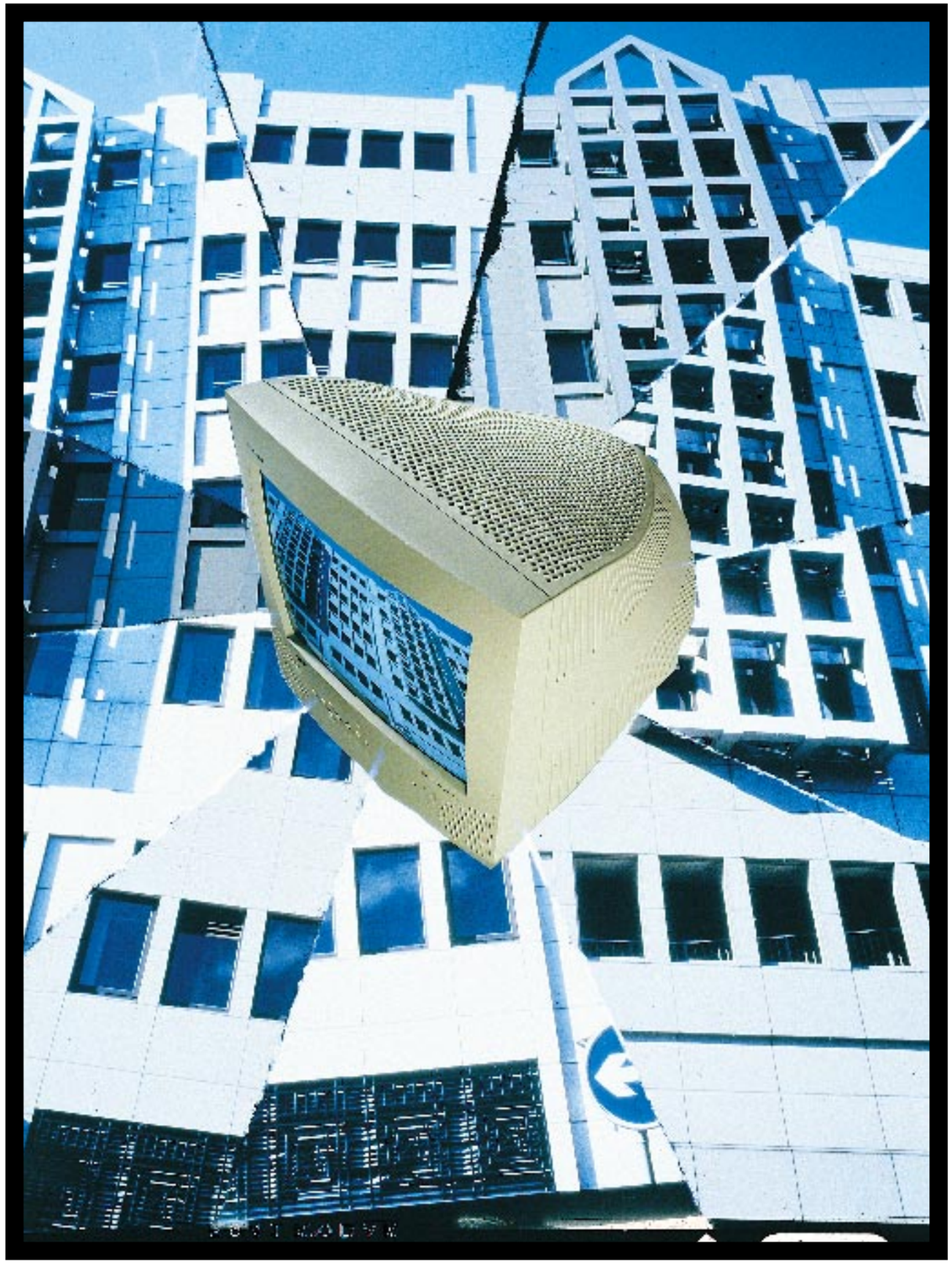
Speed is simple. You just need to check that the memory meets the minimum requirements of your system.

Parity is a way of checking the validity of data. It either exists or doesn't and is identified by an extra bit per byte, i.e. nine bits or 36 bits. If your system doesn't require parity you can still use SIMMs with parity. Many PCs have an option in the BIOS, or via a jumper, to disable parity.

The final issue is the number of pins on the SIMM. On PCs, 30-pin SIMMs have now been replaced by the 72-pin variety.

PCW Details

Thomas Leyrer, Dipl.-Ing. (FH), has worked as a field application engineer for Texas Instruments, Germany, since 1990.



Screen test

Gordon Laing directs our 26-strong monitors group test of the cream of the crop among 15in and 17in models.

THE HUMBLE MONITOR IS perhaps the most important computer peripheral you'll ever buy, simply because it is used at all times.

It is nothing less than the primary means of communication from computer to user. It conveys all your precious information.

Poor displays can give you headaches or even emit harmful radiation so why is it, when buying a new PC, most users will go for the fastest chip and the biggest disk possible yet skimp on the monitor? There is time to redeem yourself, though — that money you saved for an overdrive processor may be better spent on a new monitor.

When buying a new system, you could devote a larger portion of your budget to the display. It would seem that many already are: Romtec reported that 15in monitors are fast becoming the minimum requirement in the third-party market, while 17in is the most popular size for upgrading. Over the past few months, 17in models have even been outselling 15in models from some manufacturers.

Monitors now are not just display devices. PCs with sound capability have become so widespread as to prompt most manufacturers to put two and two together and come up with multimedia monitors — at their simplest, these include built-in powered speakers. In addition, many fit microphones and some even boast cameras, ready for video conferencing.

All manufacturers in this group test have multimedia monitors in the pipeline. In a few months' time, it may be possible to do a 100 percent multimedia monitor group test — for the present though, some models were available whereas others were not. Just under half of the monitors we've gathered together here, feature multimedia of some description.

In this group test, we've covered a major portion of the monitor market. We've reviewed no less than eleven 15in and fifteen 17in monitors. All are multi-scanning devices, capable of displaying a resolution of 1,024 x 768 non-interlaced at a flicker-free 75Hz. We've given in-depth explanations of how a CRT monitor works, the alternatives and exactly what you should know about power saving and safety standards.

The best news of all is that decent 15in monitors cost around £300, while 17in come in at about £500 — such quality has never been this cheap, and a good monitor will long outlive your PC. So do your eyes a favour: read on, and then make the best purchase of your computer life.

PCW **Monitors Photography** by David *Whyte*

Monitors CONTENTS

Behind the screens

Anatomy of a CRT monitor

A colour cathode ray tube (CRT) is like a huge glass bottle with three electron guns in its neck and the inside of its bottom coated with phosphor. The three guns (one each for red, green and blue) fire beams of electrons at the phosphor screen. Phosphors are chemicals which emit light when excited by a stream of electrons: different phosphors emit different coloured light.

The screen (or the bottom of the bottle, to continue the analogy), is covered with a matrix of dots. Each dot consists of three blobs of coloured phosphor: one red, one green and one blue. These groups of three phosphors make up what we know as a single pixel. The electron guns are aimed at their respective blobs and each is illuminated to a greater or lesser extent. The phosphors in a group are so close together that the human eye perceives the combination as a single, coloured pixel. A metal mask separates each dot to minimise "overspill" where the electron beam would otherwise illuminate more than one dot. The material commonly used for such masks is Invar.

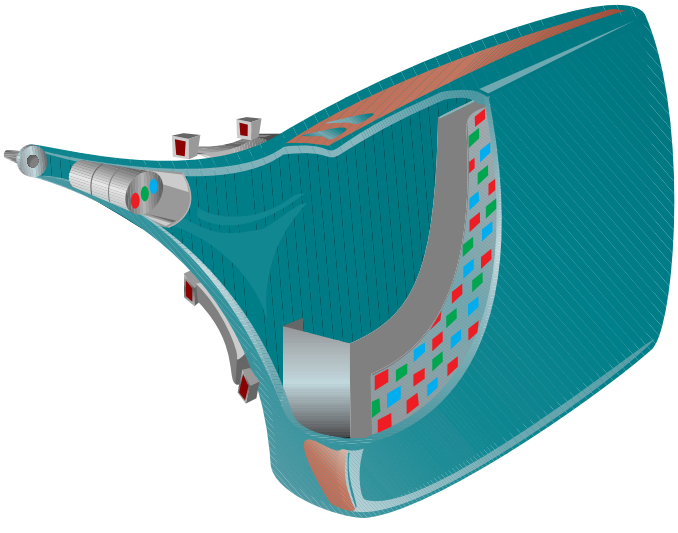
Refreshing facts

Magnetic fields can drag the electron beam to strike any point on the screen. The beam starts in the top left corner (as viewed from the front), scans across to the right, then drops down a line and starts again at the left. This process is repeated until an entire screen is drawn, at which point the beam returns to the top to start again.

The number of times a complete screen is drawn per second is the refresh rate, measured in Hertz (Hz). The higher the refresh rate, the less flicker appears on the screen up to the point where the brain perceives it as perfectly steady. A refresh rate above 70Hz is generally considered to be flicker-free, although standards bodies such as VESA are pushing for higher rates of 75Hz or 80Hz.

Some monitors draw every other line, say one, three and five until the screen is full, then return to the top to fill in the even blanks (say lines two, four, six and so on). This process is known as interlacing and results in an undesirable flickering display. Non-interlaced is where every line is drawn before returning to the top for the next frame, resulting in a far steadier display.

Consequently, it's recommended that you only ever buy a monitor which can support your desired resolution at a high refresh rate, in non-interlaced mode.



The CRT is like a large glass bottle with electron guns in the neck and its bottom coated with coloured phosphor. Notice how the holed mask sits directly before the phosphor to aid guidance and avoid overspill

Interestingly, all current broadcast television systems implement an interlaced display; our own PAL system refreshes at 50Hz. That's why a TV picture appears to flicker considerably more than a computer monitor, why a TV is cheaper at the same tube size and why ultimately you wouldn't want to sit 18ins away from one, typing for hours on end.

Hence, the three key specifications to look out for on a monitor are: the maximum resolution it will display, at what refresh rate and whether this will be non-interlaced.

The working resolution is the number of pixels the video card uses to describe the operating system's desktop, expressed as a horizontal by vertical figure. Bog-standard VGA resolution is 640 x 480 pixels while other, popular, settings include 800 x 600 and 1,024 x 768 pixels.

Remember that Windows objects, icons, spreadsheet cells and title bars will always be the same number of pixels in size whatever the resolution. Consequently, at higher resolutions they will appear smaller and you'll be able to fit more onto the desktop. Of course, make them too small and you won't be able to see them at all, which is why higher resolutions work better on physically larger monitors where the pixels are correspondingly larger.

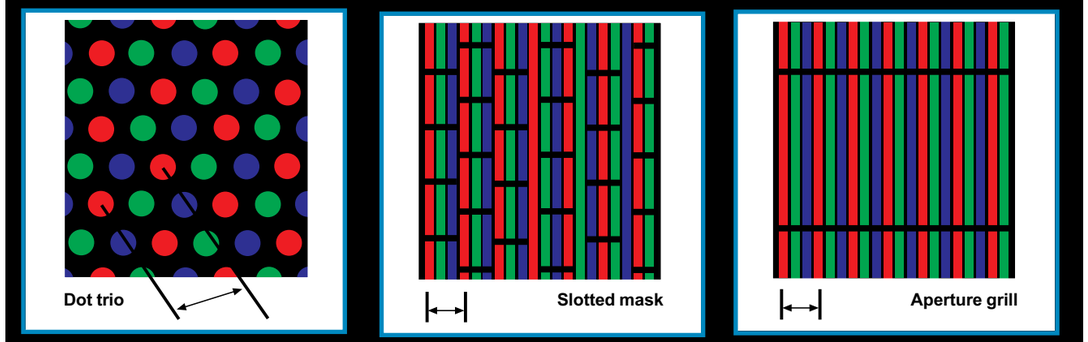
Suitable resolutions on certain sized monitors are: 640 x 480 on a 14in; 800 x 600 or 1,024 x 768 on a 15in; 1,024 x 768 or 1,152 x 882 on a 17in; and 1,280 x 1,024 or even 1,600 x 1,200 on a 20in/21in display. All monitors have a maximum supported resolution, so work out what resolution you'd like to run and whether the model in question will cope.

The combination of a particular resolution at a certain refresh rate will produce a unique signal frequency which your monitor will have to recognise and lock on to. The beauty of a MultiSync or multi-scanning monitor is that it will lock on to any signal within its horizontal and vertical scanning frequencies — if your graphics card is supplying something in this range the monitor should be able to display it. All the monitors in this group test are multi-scanning devices.

The maximum resolution of a monitor is dependent on more than just its highest scanning frequencies. It is also limited by the physical distance between adjacent groups of phosphors — this is known as the dot pitch and is typically between 0.25mm and 0.28mm.

Since each phosphor group represents the smallest pixel the monitor is physically capable of resolving, trying

Common CRT phosphor and mask arrangements



A simplified, close-up view of three CRT phosphor and mask arrangements in common use today: dot trio, slotted mask and aperture grill. It is clear which designs expose the most phosphor, resulting in a brighter display, although often at the risk of mechanical instability. The distance (shown in each diagram) between each like-coloured phosphor is the dot pitch

to address anything finer will result at best in a blurred image. If the signal falls out of the scanning frequency range, no image at all will be displayed.

Mr Blobby

There's more than one way to group three blobs of coloured phosphor — indeed, there's no reason why they should even be circular blobs. The vast majority of computer monitors do, however, use circular blobs of phosphor and arrange them in triangular formation. These groups are known as triads and the arrangement is a dot-trio design.

This is all very well, except that the mask used to avoid overspill, called a shadow mask, occupies a large percentage of the screen area. Where there's portions of mask, there's no phosphor to glow and less light means a duller image.

In the sixties, Sony developed an alternative tube technology known as Trinitron. It combined the three separate electron guns into one device: Sony refers to this as a Pan Focus gun. Most interesting of all, Trinitron tubes were made from sections of a cylinder, vertically flat and horizontally curved, as opposed to conventional tubes using sections of a sphere which are curved in both axes.

Rather than grouping dots of red, green and blue phosphor in triads, Trinitron tubes lay their coloured phosphors down in uninterrupted vertical stripes. Consequently, Trinitron tubes use masks which separate the entire stripes instead of each dot and Sony calls this the Aperture Grill. Since less of the screen area is occupied by the mask and the phosphor is uninterrupted vertically, more of it can glow, resulting in a brighter, more vibrant display.

The down side is that either one or two very fine wires must be run horizontally across the display to hold the Aperture Grill in place — they are just visible if you look closely. Trinitron tubes below 17ins or so get away with one wire, while the larger models require two.

A further down side is mechanical instability. Tap a Trinitron monitor on the side and watch the image wobble helplessly for a moment — it's not hard to understand why when you consider the aperture grill's fine vertical wires held steady in only one or two places, horizontally.

The problem is that built-in speakers would have the same effect as continually tapping the case, which is why Sony hasn't fitted any to its computer monitors. Trinitron TV sets get away with built-in speakers due to their much coarser, and hence sturdier, grilles. A TV's resolution is little above VGA.

Every copyright expires eventually and Sony's on Trinitron did so a few years ago. However, only one manufacturer, Mitsubishi, has bothered to develop its own version of Trinitron (called Diamondtron), which uses three separate guns. Diamondtron tubes were a little flaky at first but more recent attempts have been much improved, with the added advantage of a large 21in model — Sony stops at 20ins then jumps to much larger TV-type models for presentation use.

There is a third blob arrangement in popular use today. Virtually all non-Trinitron TV sets use elliptically-shaped phosphors grouped vertically and separated by a slotted mask. It is mechanically stable due to the criss-cross of horizontal mask sections but exposes more phosphor than a conventional dot-trio design. The result is not quite as bright as an Aperture Grill but much more stable and still brighter than the dot-trio.

However, the slotted mask is a complex beast and until very recently, no manufacturer could build one fine enough for high computer resolutions. NEC got there first and announced its slotted mask design, ChromaClear, last February.

Unsurprisingly, the company fitted its debut ChromaClear monitors with speakers and microphones and claims that they are "The new multimedia standard". Using the same phosphor and mask arrangement as most TV sets, the colours of computer video clips closely resemble what many of us are used to.

There are limitations to the ChromaClear tube technology. NEC may have manufactured a slotted mask much finer than a TV set but it's maximum resolution is only 1,024 x 768. The company has not managed to produce one capable of higher resolutions and, for now, is sticking to 15in and 17in models only. Consequently, those interested in high end CAD or DTP, requiring a large screen and high resolution should look elsewhere.

ADI MICROSCAN 4V

ADI's MicroScan 4V is a straightforward-looking 15in monitor. There is no multimedia nor on-screen display for that matter. It is, however, very cheap at a cost of typically less than £250 on the street.

All controls are on the front panel. A single button cycles through all the options, with an LED indicating whichever is currently selected; and two further buttons adjust. All the lights flash at the upper and lower limits. Brightness and contrast are adjusted with conventional dials.

Plug'n'play is supported with VESA DDC, as is DPMS for powering down from 85W to under 5W in "off" mode. Emissions conform to MPR-II and the tube is capable of displaying 1,024 x 768 non-interlaced at up to 76Hz. Resolving power was fairly poor all over, affecting focus and convergence. Nevertheless, the 4V easily beats any 15in monitor below the £250 price mark and comes recommended on this strength alone.

If you are interested, check out Goldstar's StudioWorks 56M as well, which offers similar quality, multimedia and an OSD for just a bit more. Both perform much more comfortably at 800 x 600 resolution and will do so at high refresh rates.

PCW *Details*

Price RRP £315 (plus VAT); street price £240 (plus VAT).
Contact ADI Systems UK 0181 236 0801

Good Points Good for the price.
Bad Points Poor image, no multimedia.
Conclusion Good budget buy.

ADI MICROSCAN 5V

The 17in MicroScan 5V is physically unrelated to the 15in 4V.

Again, the case is very simple but all the controls are hidden behind a front panel. Here, you'll find a set of buttons to adjust the brightness, contrast and correct the image.

There's no on-screen display, but the large power light flashes at the upper and lower limits of the selected range being adjusted.

The 5V meets MPR-II for emissions and conforms to DPMS, powering down from 110W to below 15W in suspend, then less than 8W in "off" mode. Additionally, it is VESA DDC plug and play compatible and is capable of displaying 1,024 x 768 at up to 80Hz non-interlaced.

Performance is good in the centre but, like many, falls off a little towards the edges. Despite this, however, it is better than many budget 17in monitors and the overall image is bright, clean and vibrant.

There are several good sub-£500 multimedia-less 17in monitors tested here and the 5V is definitely one to be considered.

Other budget contenders include the CTX 1727, Nokia's 447V, Samsung's 17Gli and the Wyse WY-17e.

PCW *Details*

Price RRP £585 (plus VAT); street price £469 (plus VAT).
Contact ADI Systems UK 0181 236 0801

Good Points A fair image for the price.
Bad Points No multimedia or OSD.
Conclusion Good sub-£500 choice.

CTX 1569MS

CTX has no less than five different series in its range of monitors, catering from entry level to high end. Somewhere in the upper middle range is its multimedia series, consisting of two models: a 15in reviewed here, and a 17in which CTX could not supply in time for this review.

On both its multimedia models, CTX has opted to fit the speakers down the left and right sides of the case. CTX's are thinner than most, avoiding the need for a wide cabinet. They sound good, too, at reasonable listening levels, only becoming harsh and breaking up at high volumes. There's a microphone built-in at the front, along with a headphone jack. Volume, contrast and brightness are adjusted by separate dials, unconnected to the otherwise excellent on-screen display which controls everything else.

The OSD is very clear, with legible, sometimes animated, icons. Resolving power is fair, and convergence and colour evenness are both excellent. The overall picture quality is high, which along with power saving, plug and play, TCO 1992 Emissions and above average multimedia in an attractive cabinet, results in an excellent buy.

PCW *Details*

Price RRP n/a; street price £299 (plus VAT).
Contact CTX Europe 01923 818461

Good Points Excellent picture, good multimedia.
Bad Points None, considering the low price.
Conclusion Great value. Highly recommended.

CTX 1785S

CTX couldn't get us its new multimedia 17in model so we reviewed the 1785S from its low to mid range Expert series.

CTX has chosen a very clean, modern, cabinet design for its multimedia and Expert series, with little round buttons on the front surface — not unlike NEC's non-multimedia range, except with thinner bevel surrounds.

For a reasonably cheap model, the 1785S boasts a high maximum horizontal scanning frequency of 85KHz, capable of displaying 1,280 x 1,024 non-interlaced at 75Hz. It is VESA DDC plug'n'play compliant, conforms to MPR-II in terms of emissions, and supports VESA DPMS power management, dropping to under 10W in suspend mode, then below 6W in "off" mode.

The on-screen display adjusts everything apart from brightness and contrast, which are catered for by dials. The OSD features decent icons, some of which are animated to indicate their function.The 1785S's performance is not up to the superb 15in multimedia CTX but it is still good, nonetheless. Every aspect was slightly above average, resulting in a good image, but nothing to rave about.

PCW *Details*

Price RRP n/a; street price £499 (plus VAT).
Contact CTX Europe 01923 818461

Good Points Above average image and OSD.
Bad Points No multimedia. Beaten by 15in model.
Conclusion A fair overall performer from CTX.

Controls

Not so long ago, advanced controls were found only on high-end monitors. Now, even budget models boast a wealth of image correction controls. The most common is barrel/pincushion, which corrects the image from dipping in or bowing out at the edges. Trapezium correction can straighten sides which slope in together, or out from each other. Parallelogram corrections will prevent your image leaning to one side, while some models even allow you to rotate the entire image.

Making more common appearances, too, these days are on-screen controls. These are superimposed graphics which appear on the screen (obscuring parts of the main image) usually indicating what you're about to adjust. It's the same as TV sets superimposing, say, a volume bar when you're adjusting the sound.

There's no standard for on-screen graphics, so consequently there's a huge range of icons, bars, colours and sizes out there. Some are much better than others. The whole point, however, is to render adjustments as intuitive, as quick and easy as possible and that's very much a combination of how the display interacts with the buttons available. It's a matter of personal taste.

Multimedia monitors

Sound facilities are becoming commonplace on many PCs, requiring additional loudspeakers and possibly a microphone, too. Why have lots of separate boxes and cables when you could fit everything into a monitor and have a one-stop shop?

Enter the multimedia monitor, which always has built-in loudspeakers of some sort, maybe a microphone and in some cases a camera for video conferencing. At the back of these monitors are connections to your sound card.

Before you get too excited, most manufacturers are jumping on the multimedia bandwagon and fitting fairly cheap speakers to their monitors. Adding only a few pounds to the cost of manufacture, most are only suitable for basic sound reproduction: the occasional beep or ding for confirmation, the CD-ROM titles which chat briefly to you, or the odd bit of games playing.

If you are serious about your sound, then you should go for decent external speakers which can also be properly magnetically shielded. With this in mind, the mechanical instability of Aperture Grill monitors doesn't seem such a big deal after all.

Alternative display technologies

There are alternatives to the ageing cathode ray tube. LCD panels, as found in notebook computers, are also sold separately as computer monitors. They are currently very expensive (over £2,000 for one capable of 1,024 x 768) but specific applications can swallow the cost. City banks need to get as much information to their brokers in as small a space as possible; so LCD panels are popular. The hang-on-your-wall large screen TV is still some way off, though.

Presentations generally require much larger than 21in displays. Options include large screen TV sets, modified to handle VGA signals, or video projectors which work like slide projectors, but with a video signal. Video projectors come in two varieties. One uses red, green and blue CRTs (high on quality, but low in convenience) and the other uses a small LCD panel and a single light source and lens to project it — high on convenience but expensive and often low on quality.

GOLDSTAR 1727

Goldstar's 1727 has recently been reduced to the bargain retail price of £502, perhaps, to make it attractive when compared to the forthcoming multimedia-equipped StudioWorks 78M model. Goldstar couldn't get us a 78M in time for the review, so we plumped for the silent 1727.

It's a very plain-looking monitor, with only a power button visible on the front. A panel opens to reveal brightness and contrast dials, with several more buttons for adjusting picture size, position and geometry, via the basic on-screen display.

Its 65KHz maximum horizontal scanning frequency is capable of 1,024 x 768 non-interlaced at 77Hz. VESA DPMS compliant power saving drops to under 15W in standby or suspend, then down to below 8W when "off". Emissions comply to MPR-II, but the 1727 is one of today's few monitors not to feature VESA DDC plug'n'play compatibility.

Results are average, with reasonable focus, convergence and colour evenness. The 1727 falls down on relatively low brightness, but at a street price of around £440, represents fair value for money.

PCW Details

Price RRP £502 (plus VAT); street price £440 (plus VAT).
Contact LG Electronics UK 01753 500400

Good Points Cheap. Fair performer.
Bad Points Forthcoming multimedia 17in is more exciting.
Conclusion Fair, for the low price.

GOLDSTAR STUDIOWORKS 56M

Goldstar has launched three new multimedia StudioWorks models, the 14in 44M, the 15in 56M and the 17in 78M. We couldn't get hold of the 78M, but did manage to check out the 56M.

Unlike the 78M which has tall, thin speakers running down the left and right sides, the 44M and 56M have theirs fitted to the bottom corners. Sound quality on the 56M was good at low volume but became quite harsh when loud. The front panel offers headphone and microphone jacks. This latter is connected directly to a similar jack on the rear, since Goldstar has neglected to build in a microphone to any of these three monitors.

The 56M's buttons are fitted to the front panel, and activate and adjust image and volume via the good on-screen display. The OSD features decent icons, words, and bars and numbers to indicate the range of a particular adjustment.

Image performance was below average, with lack of resolving power, poor convergence, luminosity and colour evenness. There were even slight discolourations in the bottom corners, suggesting poor speaker shielding. Not bad for the low price, though, and much better in 800 x 600.

PCW Details

Price RRP £315 (plus VAT); street price £260 (plus VAT).
Contact LG Electronics UK 01753 500400

Good Points Cheap. Good OSD.
Bad Points Poor image. No microphone.
Conclusion Budget buyers only.

Monitor safety: emission accomplished

The CE mark, which became law in the UK on 1st January this year, forced electronics companies into more stringent testing methods. But in the last few years monitor manufacturers have been adjusting to a whole raft of safety standards driven by Sweden and the US.

The MPR-II standard of the early nineties, based on the recommendations of Swedac, the Swedish testing authority, was a response to anxiety about the effect of electromagnetic fields on the reproductive system. It also reduced electrostatic emissions with a conductive coating on the monitor screen. MPR-II has now been adopted as an international standard.

Another standard, entitled TCO, set up by the Swedish Confederation of Professional Employees, was introduced in 1992. TCO 92 set stiffer levels for emissions and required monitors to meet the international EN60950 standard for electrical and fire safety.

The most stringent label so far is last year's TCO 95, which has become the first global environmental labelling scheme. The result of collaboration with the Swedish Society for Nature Conservation, it is more comprehensive than the German Blue Angel label and more exacting than the ISO international standards. The display, system unit and keyboard can be certified separately and the manufacturer's environmental policy is addressed at every stage from production to disposal.

Over and above TCO 92, the product may not contain cadmium or lead, the plastic housing must be of biodegradable material and free of brominated flame retardants and the production process must avoid the use of Freons and chlorinated solvents. This has required manufacturers to invest in changes which, for the moment at least, may be passed on as extra cost to the end user. The emission and power saving requirements remain unaltered although picture performance and luminance uniformity have been addressed.

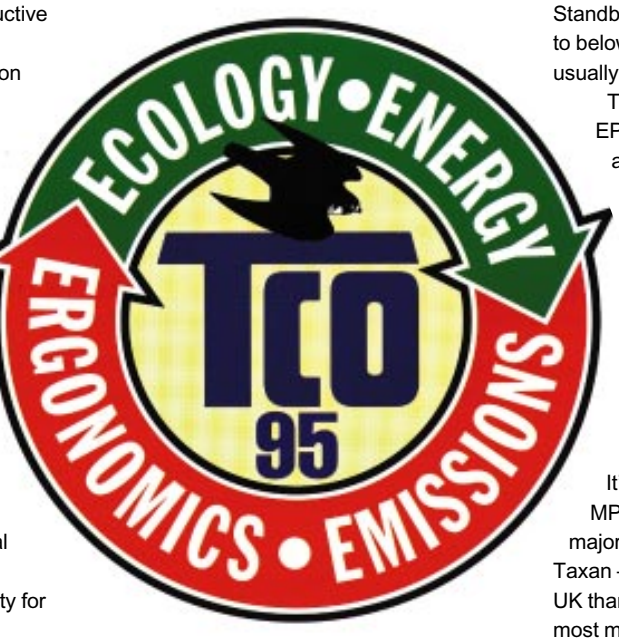
At the time of writing, there is an attempt being made to establish MPR-III as an international standard to consolidate MPR and TCO. Level "A" would be the equivalent of TCO, level "B" the equivalent of MPR-II.

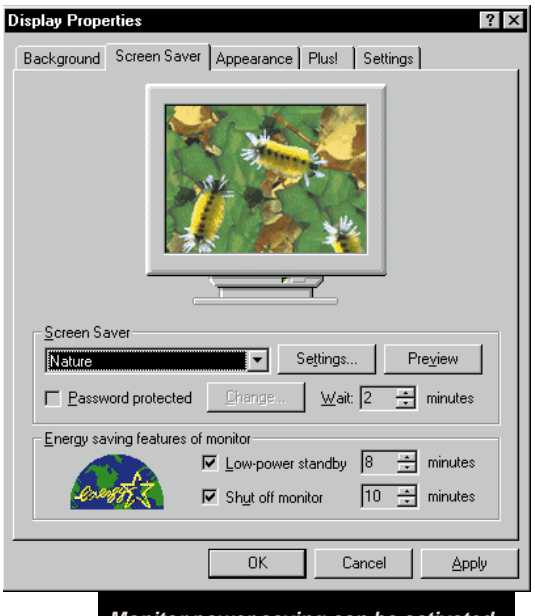
Power saving

The TCO standards require automatic power-down based on the Swedish Nutek specification 803299. A monitor is only entitled to use the TCO Power label if it can switch to less than 30W in standby mode and less than 8W in suspend.

Apart from Sweden, the main impetus has come from the US. In 1993, VESA initiated its DPMS standard, or Display Power Management Signalling. A DPMS compliant graphics card enables the monitor to achieve four states: on, standby, suspend and off, at user-defined periods. Suspend mode must draw less than 8W so the CRT, its heater and its electron gun are likely to be shut off. Standby takes the power consumption down to below about 25W, with the CRT heater usually left on for faster resuscitation.

The other power saving standard is EPA Energy Star. Mandatory in the US and widely adopted in Europe, it requires a mains power saving mode drawing less than 30W. Energy Star was initiated in 1993 but really took hold in 1995 when President Clinton announced that the US Government, the world's largest PC purchaser, would buy only Energy Star compliant products.





Monitor power saving can be activated from the Windows 95 display control panel — just set the number of minutes before power saving kicks in

The UK market

It's hard to buy a monitor which isn't MPR-II and DPMS compliant but the four major players — NEC, Philips, Sony and Taxan — report lower demand for TCO in the UK than throughout the rest of Europe. For most manufacturers, TCO has necessitated refinements to power supplies, cancellation coils and the shielding on the reflection yoke. For many, an extra anti-reflective coating was required to achieve TCO 92 labelling. NEC quotes an extra £5 to bond it to the surface of the monitor while a third-party glare filter, which has the same effect, adds £15-20 to the end user cost.

Across Europe, Philips sells MPR-II, TCO 92 and 95 models but its mainline UK product range is only MPR-II compliant due to lack of interest. The company will call TCO product from Europe — but at a price. A low radiation 17B has a list price of £570 (plus VAT) in the UK; the TCO equivalent would currently cost about £650 (plus VAT).

Taxan carries MPR-II and TCO 92 models in all sizes except 14in. It is gradually phasing out MPR-II in favour of TCO 95 but quotes a higher margin on "95" versions for the moment, due to initial development costs. A typical off-the-page price for the 17in Ergovision 730 LR without TCO is £485 (plus VAT). For £507 (plus VAT) you can buy the TCO 92 version. A 730 TCO 95, however, will currently set you back £580 (plus VAT).

Nicky Glatter

HITACHI 17MVXPRO2

Hitachi's improved and recently relaunched 17in 17MVXPRO2 monitor may be a bit of mouthful to say but it more than makes up for this in terms of performance. It is produced in Europe and complies with TCO 1992 for emissions and power saving.

The high maximum horizontal scanning frequency of 82KHz offers non-interlaced resolutions of 1,280 x 1,024 at 75Hz, or 1,024 x 768 approaching 100Hz.

Test results were very good, with high resolving powers, sharp focus and convergence, virtually no streaking or ghosting, and high brightness and colour evenness.

The case is a little old-fashioned looking, while the on-screen display relies on large, clear icons accompanied by bars, but no words or numbers.

Under instruction from a VESA DPMS compliant video card, the unit powers down from 110W to below 5W in "off" mode. It is also plug'n'play complaint with VESA's DDC standards.

It may not look flash, or offer multimedia, but the 17MVXPro2 boasts one of the best displays of all the monitors tested here. It's competitively priced, too, and comes highly recommended.

PCW *Details*

Price RRP £599 (plus VAT); street price £499 (plus VAT).
Contact Hitachi Business Systems 0181 849 2000

Good Points Excellent display. Good price.
Bad Points No multimedia. Unimaginative case.
Conclusion Superb monitor.

IIYAMA VISIONMASTER MF-8617E

An increasing number of PC manufacturers offer Iiyama monitors with their systems. The company's two most common 17in models are the VisionMaster MF-8617E and the VisionMaster Pro MT-9017E. The latter is based on a superb high-spec Mitsubishi Diamondtron tube and carries a street price of around £620. Iiyama chose to send us the 8617 FST model, which will soon be available with multimedia for an extra £30 or so.

The 8617 uses a high-specification tube, with a maximum horizontal scanning frequency of 86KHz capable of displaying 1,280 x 1,024 non-interlaced at 80Hz. Emissions conform to MPR-II and the monitor is VESA DDC plug'n'play compliant, along with supporting DPMS, powering down to below 8W in suspend and under 6W when in "off" mode.

The on-screen display is detailed, although a little small and cluttered compared with the spaciousness of others. There are two sets of video inputs, so it's possible to connect two PCs and switch between them on the same screen. The 8617 is sharp, with good convergence and excellent power regulation. It is a highly recommended monitor but check out the 9017 for a more vibrant display.

PCW *Details*

Price RRP £575 (plus VAT); street price £536 (pus VAT).
Contact Iiyama UK 01438 745482

Good Points High spec. Dual inputs
Bad Points No multimedia.
Conclusion Excellent all-rounder.

MITSUBISHI DIAMOND SCAN 17HX

Mitsubishi's Diamondtron aperture grill tube is the only decent alternative to Sony's Trinitron, but the company decided to submit one of its 17in FST models instead.

The 17HX is an above average specified monitor, with a high 78KHz maximum horizontal scanning frequency capable of 1,024 x 768 non-interlaced at 95Hz, or 1,280 x 1,024 non-interlaced at 72Hz. It does not offer multimedia but has reasonable on-screen controls.

In our tests, the 17HX scored well in terms of resolving power, colour intensity and convergence but suffered from visible streaking and ghosting. Its luminosity and colour evenness were slap bang in the middle of all the monitors tested here.

The 17HX is a fair all-round monitor and reasonably priced at around £520 on the street but is overshadowed by its more expensive Diamondtron sibling.

At around £600 on the street, Mitsubishi's superb 17in Diamondtron is available in guises from several manufacturers. It boasts a slightly higher scanning frequency and even two sets of switchable video inputs. This is certainly the model to go for if you're interested in a Mitsubishi monitor.

PCW *Details*

Price RRP £695 (plus VAT); street price £520 (plus VAT).
Contact Mitsubishi Electric 01707 278614

Good Points Fair all-rounder.
Bad Points Diamondtron version is much better.
Conclusion Spend a bit more and go for that one instead.

NEC M500

NEC, inventor of MultiSync technology, has gone for a hat trick of firsts with its debut multimedia monitor. Check out its curves: the case slopes inwards from all directions toward the rear, resulting in a compact, space-conscious box.

Slotted masks, as used in many TV tubes (explained in our main text), offer brightness and focus nearing that of aperture grill tubes such as Trinitron, but boast considerably higher mechanical stability. NEC is the first company to develop a slotted mask with a pitch fine enough for high-resolution computer applications; NEC calls it ChromaClear and it's capable of 1,024 x 768 non-interlaced at 85Hz. The result is a bright display with superb colour alignment and convergence: resolving power and regulation are average, however. NEC's additional video booster along with unsurpassed on-screen controls offer extensive customisation and enhancements. Motion video colours resemble those on familiar TV sets. The otherwise adequate speakers can be improved by fiddling with the controls: bass, treble and simulated surround. From June the 15in M500 and the new 17in M700's emissions comply with TCO 1992; avoid early MPR II models.

PCW *Details*

Price RRP £529 (plus VAT); street price £410 (plus VAT).
Contact NEC UK 0645 404020

Good Points Innovation from all directions.
Bad Points Pricey. Some may dislike the cabinet.
Conclusion The most original monitor yet — it's good, too.

NEC XV17

With the new multimedia M series, NEC now offers four ranges of monitors. The other three, in descending order of cost and performance are XP for professional, XE for efficiency, and XV for value.

The XV17 will set you back around £550 on the street, which is fairly high for a "value" 17in but then at least NEC's name ensures you are still getting a decent product.

Its 65KHz maximum horizontal scanning frequency is good for 1,024 x 768 at up to 80Hz non-interlaced. The tube is dark and delivers a high-contrast, vibrant image. The design of the case is very clean and modern, and features NEC's trademark wide surrounding bezel.

The on-screen controls are colourful and even crudely animated at times to indicate the results of an adjustment. Brightness and contrast are adjusted with a pair of traditional dials, without indication of on-screen controls.

Our results show the XV17 to be bright and colourful but lacking ultimate focus and resolving power. It is still a fair monitor although slightly overpriced, especially considering the lack of multimedia.

PCW Details

Price RRP £799 (plus VAT); street price £550 (plus VAT).
Contact NEC UK 0645 404020

Good Points Good OSD and image.
Bad Points No multimedia. Expensive.
Conclusion Slightly overpriced.

NOKIA 447V

Nokia's 447V is an attractive 17in monitor with downward-firing built-in speakers: small, neat grilles in the bottom corners betray their presence.

Sound quality is good, but whacking up the volume disturbed the picture itself, particularly when playing back loud CD music. There is no built-in microphone.

No less than eight rocker switches adjust volume, balance, brightness, contrast, and the variety of image controls. There's no on-screen display, but the entire display flashes dark and light to indicate the maximum and minimum ends of the range.

The 447V powers down from a relatively high 150W, to below 30W in suspend and under 8W in "off" mode. Emissions conform to MPR-II but plug'n'play is not supported. The maximum non-interlaced refresh rate at 1,024 x 768 is 80Hz.

The picture quality is generally very good and the image is well focused, while the power regulation is excellent. It's not a bad street price either.

The 447V is ageing, but shows how a well-designed model can still hold its own against younger blood.

PCW Details

Price RRP £549 (plus VAT); street price £475 (plus VAT).
Contact Nokia Monitors 01793 512809

Good Points Fair image. Nice case.
Bad Points No OSD or plug'n'play.
Conclusion Ageing but still respectable.

NOKIA 449M (092)

We reviewed the Nokia 449M (O92) version which conforms to TCO 1992 emissions. It's based around a 15in Sony Trinitron tube: a component which becomes immediately obvious as soon as you switch on the monitor. The image is as bright and vibrant as all typical Sonys.

The 449M uses a single wire to hold the Aperture Grill in place, which, like the 15in Sony, somewhat disconcertingly fades in and out of view, as if twisted.

The 449M is VESA DDC plug'n'play compliant and also powers down with a DPMS signal from 100W to under 30W in suspend mode and below 8W when "off". The monitor supports a 1,024 x 768 resolution non-interlaced at up to 76Hz. A disk of Nokia monitor specifications is supplied for Windows 95.

Compared with the newer models, the 449M's case looks a little old-fashioned. Two buttons select options, which two more adjust with the aid of the on-screen display.

The image lacks resolving power and convergence toward the corners but power regulation is good. Overall, the 449M is good, but competes directly with the popular Sony 15sfII.

PCW Details

Price RRP £379 (plus VAT); street price £325 (plus VAT).
Contact Nokia Monitors 01793 512809

Good Points TCO 1992. Vibrant image.
Bad Points No multimedia.
Conclusion Good, but check out the Sony 15in.

PANASONIC 15MM

Panasonic's debut multimedia monitors feature the company's Top Dome stereo sound system, originally designed for its small, domestic, television sets.

The 15MM is a good-looking monitor, with the speaker grilles running down the left and right sides. They are quite narrow, however, and do not overly widen the cabinet.

Emissions conform to TCO 1992 levels, while DPMS compliant video cards will drop the 120W power consumption to below 8W in "off" mode. The 15MM is VESA DDC plug'n'play compliant too.

The on-screen display is operated by two buttons to select the desired option, while another two adjust. The icons are okay and cover typical controls, apart from rotation: there are two preset colour temperatures. The volume is adjusted from a separate pair of keys, along with a mute button and the level is indicated on the OSD. There are no tone controls.

Picture quality is average but better than the 17in version. Most image aspects were okay in the middle but began to lose it towards the corners. This included convergence, focus and colour uniformity. On the plus side, Panasonic's speakers were well above average.

PCW Details

Price RRP £399 (plus VAT); street price £340 (plus VAT).
Contact Panasonic 0500 404041

Good Points Great speakers. TCO 1992.
Bad Points Average picture quality.
Conclusion Outperformed by cheaper models.

PANASONIC 17MM

Panasonic's 17in multimedia monitor shares the speaker technology the company employs in its small TV sets, resulting in sound quality equal to or above most of the models in this feature. The speaker grills are fitted vertically on the left and right sides of the case, but are narrow enough not to widen it too much. A microphone is built in.

The on-screen display features reasonable icons and a fairly methodical navigation, two selection buttons and another two to adjust. Volume is controlled by another two buttons, while the level is indicated on the OSD. The 17MM conforms to TCO 1992 for emissions, VESA DDC for plug'n'play compatibility, and DPMS which reduces the maximum consumption of 120 Watts to below 8 Watts in "off" mode.

The image is slightly unfocused in the corners, where convergence also begins to fall out of line. There are slight discolourations, suggesting inadequate magnetic shielding from the speakers. The 15MM model is by no means a great performer but outguns the 17MM, particularly in terms of brightness. Panasonic has got the multimedia aspect right though, with above-average speakers.

PCW Details

Price RRP £735 (plus VAT); street £685 + VAT
Contact Panasonic 0500 404041

Good Points Great speakers; TCO-1992.
Bad Points Poor image, pricey.
Conclusion Too expensive for its performance.

PHILIPS 17B

In Philips monitor hierarchy, the B models represent the middle of the range. The 17B is a plain-looking monitor with only a turquoise power button for style, but its performance is by no means dull.

There's no microphone and the rated power of the built-in speakers is low, but the sound that emerges is really rather good with an unusually spacious stereo effect. The 17B supports all the usual standards, including MPR-II for emissions, VESA DDC for plug'n'play and DPMS for power saving. It powers down from 110 Watts to under 15 Watts in suspend and less than 5 Watts in "off" mode.

Volume, contrast and brightness are adjusted with dials, leaving image correction to the gaudy, but clear and informative, on-screen display. Functions like Geometry Correction are described by large icons and words. Focus and resolving power are below par, while convergence, colour evenness and luminosity are just alright. Power regulation is excellent. Despite these average results, the overall picture experience is bright, vibrant and good enough for most budget applications.

PCW Details

Price RRP £570 (plus VAT); street £540 (plus VAT)
Contact Philips Consumer Electronics 0181 689 4444

Good Points Good sound.
Bad Points A tad too pricey on the street.
Conclusion Beaten by many budget 17in's.

PHILIPS BRILLIANCE 15A

Philips monitors fall into three ranges, C, B and A, in ascending order of performance. Subsequently the Brilliance 15A is Philips' top-end 15in monitor.

Not a company to hold back on self-praise, the 15A boasts what Philips calls "Brilliant Sound". It's actually a technical term referring to the number of audio features unique to the 15A. Principal is Philips' Acoustic Horn Technology, configured specifically to the 15A. The resulting sound is certainly above average but is slightly tinny and distorts at high volumes.

The cabinet is stylish, with many curves and grills, along with a big silver power button. The speaker grills are fitted down the left and right sides, and the built-in microphone sits above the tube in the middle.

Volume, brightness and contrast are adjusted with three conventional dials, while image correction is catered for by a set of buttons and accompanying lights. Shock horror! — no on-screen display: Philips claims it chose to spend the money on the audio instead.

Resolving power, colour evenness and luminosity are above average, but power regulation is poor and some streaking is visible.

PCW Details

Price RRP £350 (plus VAT); street £280 (plus VAT)
Contact Philips Consumer Electronics 0181 689 4444

Good Points Sound, style and price.
Bad Points No OSD; average picture.
Conclusion Good, but bettered by some.

SAMSUNG SYNCMASTER 15M

Samsung's first multimedia range arrived in time for a review of the 15in, but sadly not the 17in model. The SyncMaster 15M is a good-looking monitor, with its speakers fitted down the left and right sides of the display. The resulting case is fairly wide but still attractive. There is a built-in microphone.

Mounted on the front surface are buttons to mute the speakers, deactivate the microphone and adjust the sound properties, which include bass, treble and balance. Behind a panel lie the image controls. All sound and image adjustments are aided by the fair on-screen display.

Resolving power begins to fall off in the corners, but convergence and regulation are good and there is little or no streaking. Cycling through plain coloured test patterns revealed the slightest magnetic interference from the built-in speakers, but this is not at all noticeable in daily use. As compensation the speakers are very good and fail to distort or affect the image except at very high volumes.

The 15M didn't come out too well in our colour evenness and luminosity tests; indeed, it did look a little dull, but otherwise represents good value for money.

PCW Details

Price RRP n/a; street £291 (plus VAT)
Contact Samsung Electronics 0181 391 0168

Good Points Speakers; price.
Bad Points Image beaten by many.
Conclusion Better 15's out there.

SAMSUNG SYNCMASTER 17GLI

Samsung's multimedia-less GLi series consists of four models: two 15in and two 17in. The higher-end £699 RRP 17Glsi supports a maximum horizontal scanning frequency of 85kHz, while the cheaper £599 RRP 17GLi, reviewed here, offers 65kHz delivering 1024 x 768 at up to 76Hz.

All Gli models feature good-looking cases with a slightly rounded lip, and most controls are hidden behind a front panel. Brightness and contrast are adjusted with conventional dials without on-screen help, while all other controls are operated via the clear OSD. One small but annoying point is that the screen flickers momentarily when the OSD is switched on or off.

The 17GLi is VESA DDC plug'n'play compliant, supports DPMS, powering down from 100 Watts to below 15 Watts then under 5 Watts in suspend and "off" modes respectively. Emissions meet MPR-II.

The unit had some difficulties resolving the toughest patterns, but made up for that in terms of very good convergence, power regulation, and above average colour evenness and luminosity. It's a good budget monitor, but is close to the price of much better models.

PCW *Details*

Price RRP £599 (plus VAT); street £479 (plus VAT)
Contact Samsung Electronics 0181 391 0168

Good Points Above average performance.
Bad Points No multimedia.
Conclusion Good, but beaten by others

SONY 15 SFII

Sony's original 15sf won awards left, right and centre, including one from ourselves, and fast became one of the best-selling 15in monitors around. It displayed the typical Trinitron properties of being bright, vibrant and colourful without compromising on sharpness. The 15sfII's cabinet is the same neat design as the earlier 15sf: a shrunk down version of the 17sf and sfII. A thin surround gently curves out in the lower right corner to accommodate adjustment and selection controls. The on-screen display is informative, with bars and numeric indicators. The 15sfII is MPR-II compliant and there's a TCO-1992 version available.

Trinitron Aperture Grilles are sensitive to mechanical interference, which is why Sony hasn't fitted speakers to any of its new monitors. Fine wires running horizontally keep the Grille in place — two on a 17in or larger, one on anything below. The single wire on our 15sfII was slightly twisted, appearing to fade in and out and consequently more visible than the two of the 17sfII. It's not quite as good a performer either, lacking the resolving power and shocking vibrancy of the 17sfII. Still a great monitor though.

PCW *Details*

Price RRP £395 (plus VAT); street £300 (plus VAT)
Contact Sony Computer Peripherals 0181 760 0500

Good Points Good image and price.
Bad Points Not as impressive as the 17sfII.
Conclusion Should be considered.

SONY 17 SFII

Switch on Sony's sfII and you're immediately in love. It's just so much brighter than any other monitor in this test. The vibrancy of the Trinitron tube literally jumps out and grabs your attention — without inducing a headache, we might add.

The attractive cabinet is no different to the 17sf which came highly commended in last year's group test. This version II model still features a small lip at the bottom right, where the adjustment controls are located. Choose your option, then adjust using the excellent on-screen display as an indicator.

Due to the mechanical instability of the Trinitron Aperture Grille Sony has chosen not to figure out how to fit and suitably shield built-in speakers. Instead, the updated models boast improved specifications and compatibility, including plug'n'play and DPMS. Emissions conform to MPR-II although a TCO 1992 version is also available.

Resolving power is excellent, as are convergence and focus. There's no ghosting and colour evenness is above average.

There may be no multimedia but the price is low enough for you to buy external speakers, and the performance is nothing short of superb.

PCW *Details*

Price RRP £649 + VAT; street £500 + VAT
Contact Sony Computer Peripherals 0181 760 0500

Good Points Fantastic image.
Bad Points No multimedia.
Conclusion A clear winner.

TAXAN ERGOVISION 730 TCO-S

According to Romtec, Taxan had the largest market share of monitor sales in the UK last year. It's not surprising, with the company sourcing the highest quality components and putting them together in competitively-priced packages.

The Ergovision 730 TCO-S is one of Taxan's new multimedia range, and the company has clearly gone for a bolt-on approach. The lower speaker section is attached to the main unit, saving Taxan the cost of manufacturing a completely new cabinet. Audio controls are located on the outside while all other controls are hidden behind a panel. The sound quality is average, but this whole lower portion comes across as cheap and badly thought out.

Fortunately the rest of the monitor is good. It conforms to TCO 1992 emissions, and indeed Taxan is one of the few companies that will sell you a TCO 1995 model if so desired. It's plug'n'play and DPMS compliant and features a basic, but clear, on-screen display.

Performance is good, with sharp focus, no moiré patterns or streaking, and decent convergence. Colour evenness and luminosity fell in the middle of our test results.

PCW *Details*

Price RRP £695 (plus VAT); street £507 (plus VAT)
Contact Taxan Europe 01344 484646

Good Points Good image, specification and price.
Bad Points Multimedia a bolt-on afterthought.
Conclusion Good all-rounder.

VIEWSONIC 15GA

Viewsonic's multimedia monitors are rebadged Panasonics. The 15GA is a Panasonic 15MM in a slightly different box. Where Panasonic's is flush with the bevel all the way around, Viewsonic has its speaker grilles slightly indented at the tube side. There is a built-in microphone.

The speakers still run down the left and right sides and, like the Panasonic, sound well above average. Viewsonic rather modestly labels them "PerfectSound Multimedia". Volume and mute are controlled by three buttons while all image adjustments are made with an additional four: two to navigate and two to adjust. All controls including multimedia are aided by the on-screen display.

The 15GA is VESA DDC plug'n'play compliant, conforms to TCO-1992 emissions and supports DPMS, powering down from 120 Watts to under 8 Watts in "off" mode. It will do 1024 x 768 non-interlaced at 86Hz but loses resolving power, particularly towards the corners, at this resolution. There's mis-convergence in the corners too, and signs of poor power regulation.

Sound and design are in the 15GA's favour, but both it and the Panasonic 15MM are outperformed by cheaper models.

PCW *Details*

Price RRP n/a; street £359 (plus VAT)
Contact Viewsonic Europe 0181 781 6986

Good Points Speakers; TCO-1992.
Bad Points Average image.
Conclusion Overpriced.

VIEWSONIC 17GA

Viewsonic's 17GA multimedia monitor is a rebadged Panasonic 17MM in a slightly different case. Like the Viewsonic 15GA, the 17GA's speaker grilles slope in towards the tube whereas Panasonic's sit flush with the bevel. There is a built in microphone.

Panasonic based its monitor speakers on those it fits to its small TV sets and the same technology found in the Viewsonic 17GA certainly sounds very good. Perhaps not the "PerfectSound Multimedia" promised but well above average. The on-screen display is good and includes settings for the sound volume.

The 17GA is VESA DDC plug'n'play compliant, conforms to TCO-1992 emissions and supports DPMS, powering down from 120W to under 8W in "off" mode. A maximum 86Hz non-interlaced refresh rate is offered at 1,024 x 768.

Apart from good sound, TCO-1992 conformity and a nice case, there's not a lot else to recommend the 17GA. Its image is okay but nothing special and loses focus at a 1,024 x 678 resolution. Its typical street price is much lower than the figure Panasonic quotes for its 17MM but cheaper models still out-perform it.

PCW *Details*

Price £589 (plus VAT), street; RRP n/a
Contact Viewsonic Europe 0181 781 6986

Good Points Great speakers; TCO-1992.
Bad Points Poor image.
Conclusion Overpriced, but cheaper than Panasonic.

WYSE WY-15E

First things first: the WYSEvision WY-15E is a very cheap monitor. At an RRP of only £265, it's reasonably fair to expect and perhaps even forgive a few problems. There is no built-in multimedia however, which keeps costs down.

The case is at least quite stylish, with a large curved lower section and an incredibly simple front panel. One button actives the fair on-screen display, while the brightness and contrast rocker switches double up as selectors and adjusters.

The WY-15E supports DPMS, powering down from the maximum 100 Watt consumption to under 15 Watts in suspend, then below 8 Watts in "off" mode. Emissions conform to MPR-II but the monitor is not DDC plug'n'play compatible. Convergence is good, but in every other image respect the WY-15E is poor. It particularly falls down on focus, while a poor power regulator is revealed by a temporarily wobbling and jumping image when you maximise a window.

The WY-15E could display the test signal of 1024 x 768 at 75Hz non-interlaced, but that's about as far as it goes. If you want a cheap monitor to drive at lower rates it's worth considering, but otherwise try elsewhere.

PCW *Details*

Price RRP £265 (plus VAT); street £249 (plus VAT)
Contact Wyse Technology 01734 342200

Good Points Cheap; interesting case.
Bad Points Poor image.
Conclusion Only for the real budget buyer.

WYSE WY-17E

Like its smaller 15in counterpart, the WYSEvision WY-17E is a rock bottom budget monitor. It shares a similar case styling, with a huge curved lip and very simple front panel controls. There are no built-in speakers or microphone.

The specification is similar, meeting MPR-II in terms of emissions, supporting DPMS for powering down to below 15 Watts then under 8 Watts in suspend and "off" modes respectively, but offering VESA DDC plug'n'play compatibility — a feature the WY-15E is missing. The on-screen display is okay but not used to indicate the brightness and contrast settings.

The WY-17E's performance is better than the 15in model, with superior convergence and video bandwidth, but focus still loses it towards the corners. There's still the problem of a poor power regulator, resulting in a short bout of image instability and general wobbling whenever, say, a window is maximised.

The conclusion is the same as the WY-15E. The WY-17E is undeniably cheap, but pays for it in terms of quality. It will display our test signal but is best suited to lower resolutions.

PCW *Details*

Price RRP £474 (plus VAT); street £465 (plus VAT)
Contact Wyse Technology 01734 342200

Good Points Nice case design; cheap.
Bad Points Picture quality low.
Conclusion Budget buyers only.

Monitors

How we did the tests

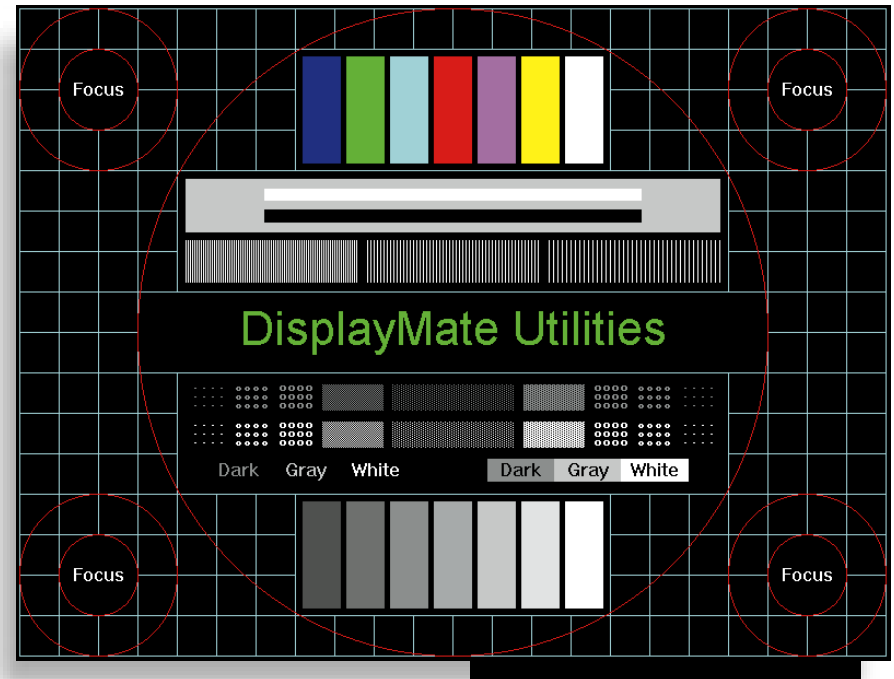
Measurement of colours may seem to be in the realm of fine art, but there are well-defined units to express both colours and brightness. Colour spaces enable the mapping of tristimulus (red, green and blue) values into a 2D graph. In 1931, the Commission Internationale d'Eclairage (CIE) proposed a colour model as an international standard for colour measurement. This model was further refined in 1976. Our measurements are made in CIE 1976 colour space.

Brightness, or luminosity, also has its own units of measurement. Again, the actual level of luminance is unimportant, provided that it is even enough across the entire screen area.

All monitors are affected to some extent by ambient electromagnetic fields, such as those emitted by neighbouring items of electrical equipment, from the earth's magnetic poles and also from steel-framed buildings. VNU Labs' test bed was set up to minimise these effects: screens were tested away from other electrical equipment, and in the centre of the room.

Starting from an ambient temperature of 18˚C, the monitors were switched on to warm up for an hour and a half before being tested and were degaussed prior to measurements being taken. It's a general rule that analogue circuitry reaches greater stability at its operating temperature, so the colour analyser was also calibrated after having been warmed-up for an hour.

A Minolta CA-100 colour analyser was used to measure the evenness of colour across the edges and in the centre of each screen. This device is a colorimeter, which produces x and y CIE colour co-ordinates independently of hues and brightness, using a handheld photodiode sensor probe. A PC running DisplayMate for Windows (with a Matrox MGA display adaptor) provided the test images. The drivers were set for 1,024 x 768 pixels, in 16-bit colour at a 75Hz vertical non-interlaced refresh rate.



DisplayMate for Windows offers an invaluable suite of monitor test utilities

The first test measures the maximum brightness of a monitor displaying a plain white screen: this reading gives a good indication of the monitor power supply unit's (PSU) capacity. The PSU is one of the most important components of a good monitor and affects many other facets of display quality like screen regulation and transient responses. Following the first test, all monitors were adjusted to give a luminance reading of roughly 50cd/m^2 on the white screen.

Next, readings figures were obtained for white, red, blue and green screens, generated at their maximum saturation levels. The tests render two sets of measurements (colour and luminance) for each of the five points mentioned, and the overall monitor performance is calculated by taking the deviation from the screen centre's values. Many monitors now allow adjustment of the colour temperature and doing this affects the absolute colour space readings, but not the relative colour purity which is mostly affected by poor internal shielding and poor screen degaussing.

Results are expressed relative to the Panasonic Panasync 17in. Colour purity and luminosity give a good indication to the quality of a monitor. These results do not take into account dot focus and misconvergence, which were judged subjectively by a panel of users. Built-in speakers were tested with CD music, games and Windows system sounds with attention paid to distortion and image interference, along with subjective quality. On-screen controls were again shown to a panel which commented on presentation and ease of use. The overall results and winners are mentioned in the reviews and conclusion.

VNU European Labs

Monitors

Editor's choice

Today's monitors are far more than just plain displays. They boast automatic power saving, on-screen controls, plug'n'play and, in many cases, built-in speakers, microphones, and even video cameras.

Fortunately, their primary function, of image display, has improved in quality while overall prices have dropped — isn't the computer industry a wonderful thing? £300 will get you a respectable 15in, while £500 gets you a decent 17in; both monitors capable of locking on to a range of signals up to resolutions of 1024 x 768 non-interlaced at 75Hz or higher.

However, before discussing the winners and losers in this group test, here are our findings on the technological advancements. On-screen displays (OSD) were once unusual but are now the norm. All but the oldest or cheapest models in this round-up feature the superimposed graphics which supposedly help you adjust your monitor settings. There are no standards for OSDs, so quality, scope and usability vary enormously. Many users prefer a huge row of buttons instead of navigating a potentially tortuous array of nested options with only a pair of buttons and a load of graphics for company. Once again, OSDs are another aspect of monitors which are subjective: while some are obviously great, others are awful, so try before you buy.

There's fortunately no trouble with power saving. So long as your monitor and graphics card are VESA DPMS compliant (see the box, "Monitor safety: emission accomplished"), you can look forward to an environmental- and money-saving future. Just set the power-down for x minutes in the boxes in your graphics card or Windows 95 display properties and you're literally "off".

Another VESA standard, DDC 1 and 2 A/B, offering the infamous plug'n'play compatibility, is different matter. The idea is a good one: the first level of DDC has the monitor deftly communicating its capabilities to anyone who's listening, while the second level allows a two-way conversation. The graphics card says "Hey, I can do this, what can you do?" to which the monitor replies "Nice to meet you — I can't do that, but I can do this." A little more banter later and both devices are automatically working at their optimum.

However, in our experience, Windows 95 successfully detects a DDC-compliant monitor but sets it to run at a much lower refresh rate than both it and the graphics card are capable of — another case of set it manually until all hardware and software manufacturers get up to speed.

Editor's Choice

- CTX 1569MS
- Sony 17 sfII

Highly Commended

- ADI MicroScan 4V
- Hitachi 17MVXPro2
- NEC M500
- Taxan Ergovision 730 TCO-S

Multimedia is another slightly missed opportunity. Before you dismiss a monitor without multimedia, bear in mind that most of the manufacturers are fitting extremely cheap speakers. Some sound adequate for general use but you'll achieve the same results with a pair of external speakers costing up to £30. Of course, separate speakers are not as neat a solution as having everything built in, but it's not the end of the world if they don't. Those serious about their sound should certainly invest in separate-powered speaker packages, many of which consist of two satellite units and one sub-woofer, hidden conveniently out of view.

15in monitors

On to the Editor's Choice, and 15in monitors first. It would seem that the first models to be shipped from brand new multimedia ranges are 15in sizes, with 17s having to wait for a couple of months. Having said this, our first Highly Commended award goes to a multimedia-less model representing superb value: at £240 (plus VAT) on the street, ADI's MicroScan 4V is the best of the budget 15in monitors we tested. Although not up to the quality of better models, the 4V easily outperforms those awful, bundled 14in monitors. Also recommended, but not award-winning, is the Philips Brilliance 15A.

A second Highly Commended award goes to the breathtakingly innovative NEC M500. Not only is it NEC's first desktop multimedia monitor, but it also boasts an excellent OSD, a brand new tube technology and one of the most unusual cases we've ever seen. Not cheap at £410 (plus VAT) on the street, but certainly original.

The Editor's Choice in the 15in section goes to CTX for its new multimedia 1569MS. It's a clear winner, with a great picture, above average sound quality, a clear OSD and even compliance with TCO-1992 for emissions, all for £299 (plus VAT) on the street.

17in monitors

Moving swiftly on to the 17in monitor sees fewer multimedia models but a fierce battle on image quality. Iiyama and Mitsubishi offered excellent monitors, just missing awards, although given the choice we'd sooner opt for the Diamondtron versions from both companies.

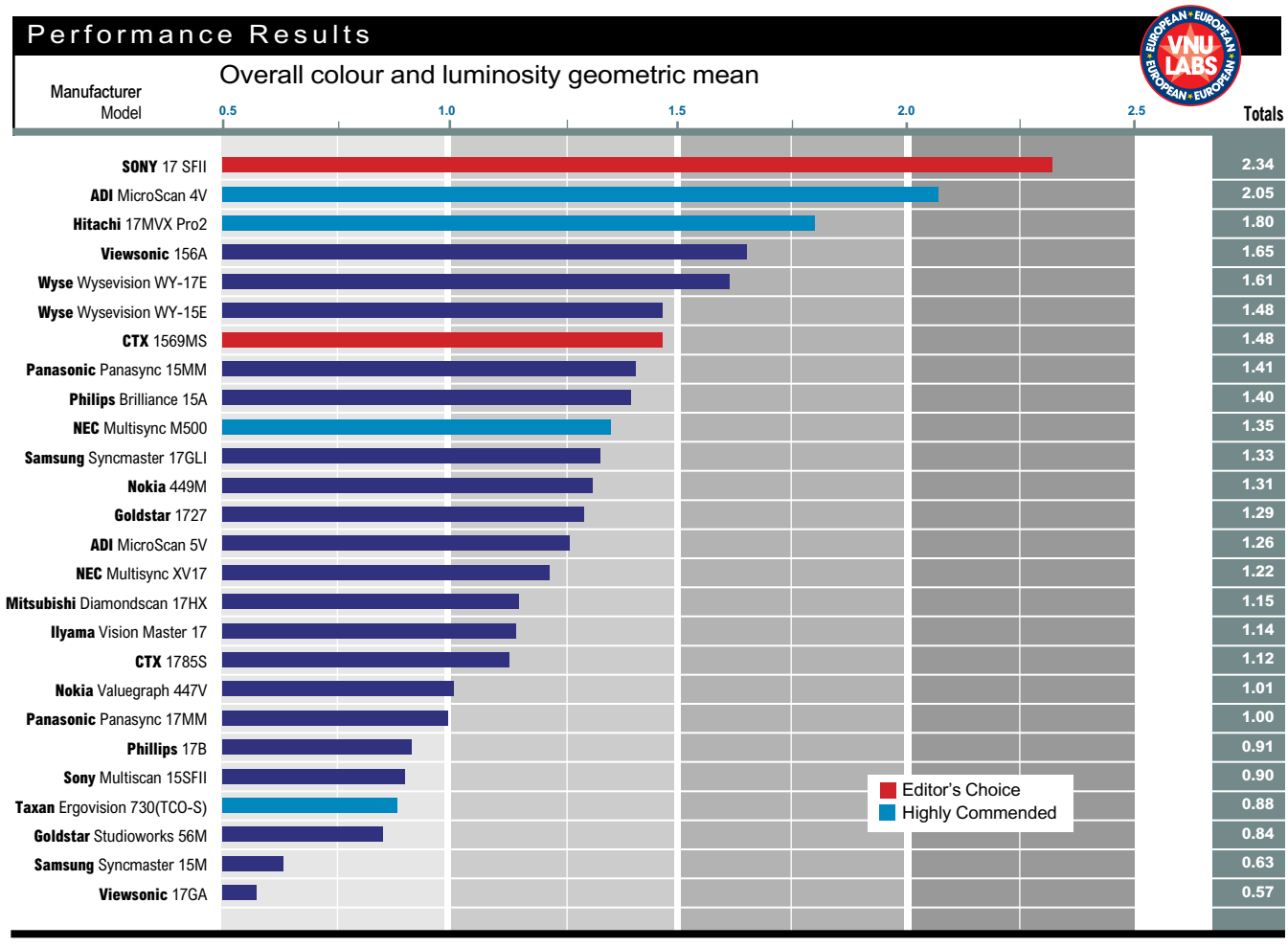
Hitachi's 17MVXPro2 is a bit of a mouthful and has a disappointingly old-fashioned look about it, but the picture is superb and, at £499 (plus VAT) on the street, earns itself a Highly Commended award.

Scoring low in the bolt-on speaker design stakes, Taxan's Ergovision 730 TCO-S gets the thumbs up in every other department: great picture, fair sound, TCO-1992 compliance and a good street price of around £507 (plus VAT) means it comes Highly Commended.

The overall 17in winner is… shock-horror… not a multimedia monitor: indeed, there are technological doubts as to whether its tube design could support built-in speakers. Nevertheless, almost from the moment we plugged it in there was no doubt that this would be our Editor's Choice in terms of sheer image quality. Sony's new and improved 17sfII, at £500 (plus VAT), is so vibrant it almost smacks you in the face. Its colour evenness and luminosity were leaps and bounds above the rest. Another triumph for Trinitron: just buy yourself a pair of powered speakers to sit alongside and you're complete.

Gordon Laing

Performance Results



MONITORS TABLE OF FEATURES

1

Manufacturer	ADI	ADI	CTX	CTX	Goldstar	Goldstar
Model	MicroScan 4V	MicroScan 5V	1569MS	1785S	StudioWorks 56m	1727
Visible tube size	348mm	407mm	352mm	405mm	353mm	408mm
Speakers	❍	❍	3 + 3 W	❍	2 + 2 W	❍
Microphone	❍	❍	●	❍	❍	❍
Plug n Play	●	●	●	●	●	❍
Horizontal frequency	31 - 64 kHz	30 - 64 kHz	30 - 70 kHz	30 - 85 kHz	30 - 65 kHz	30 - 65 kHz
Vertical frequency	50 - 100 Hz	50 - 100 Hz	50 - 120 Hz	50 - 120 Hz	50 - 110 Hz	50 - 120 Hz
Max bandwidth	85 MHz	95 MHz	85 MHz	135 MHz	110 MHz	111 MHz
Dot pitch	0.28mm	0.28mm	0.28mm	0.26mm	0.28mm	0.28mm
Emissions	MPR II	MPR II	TCO 1992	MPR II	MPR II	MPR II
Max consumption	85 W	110 W	100 W	130 W	90 W	100 W
Suspend consumption	< 30 W	<15 W	<15 W	<10 W	<15 W	<15 W
Off consumption	< 5 W	< 8 W	< 8 W	< 6 W	< 8 W	<8W
On screen display	❍	❍	●	●	●	●
Size/position control	●	●	●	●	●	●
Pincussion control	●	●	●	●	●	●
Trapezoid control	●	●	●	●	●	●
Rotation control	●	❍	●	●	●	●
Preset colour temps	1	1	3	3	2	1
Dimensions (whd)	364 x 368 x 390mm	402 x 416 x 435mm	395 x 395 x 407mm	418 x 439 x 417mm	359 x 372 x 385mm	420 x 438 x 479mm
Weight	14.3 kg	17.5 kg	13.6 kg	17.5 kg	13.4 kg	22 kg
RRP	£315+VAT	£585+VAT	n/a	n/a	£315+VAT	£502+VAT
Typical street price	£240+VAT	£469+VAT	£299+VAT	£499+VAT	£260+VAT	£440+VAT
Contact	ADI Systems UK	ADI Systems UK	CTX Europe Ltd	CTX Europe Ltd	LG Electronics UK	LG Electronics UK
Telephone	0181 236 0801	0181 236 0801	01923 818461	01923 818461	01753 500400	01753 500400

KEY ● Yes ❍ No

MONITORS TABLE OF FEATURES 2

Manufacturer	Hitachi	Iiyama	Mitsubishi	NEC	NEC
Model	17MVXPro2	MF-8617E	Diamond Scan 17HX	M500	XV17
Visible tube size	404mm	400mm	400mm	349mm	393mm
Speakers	❍	❍	❍	2 + 2 W	❍
Microphone	❍	❍	❍	●	❍
Plug n Play	●	●	●	●	●
Horizontal frequency	24.8 x 82 kHz	27 - 86 kHz	31 - 78 KHz	30 - 69 kHz	31 - 65 kHz
Vertical frequency	50 - 120 Hz	50 - 160 Hz	50 - 130 Hz	55 - 120 Hz	55 - 100 Hz
Max bandwidth	135 MHz	160 MHz	135 MHz	85 MHz	85 MHz
Dot pitch	0.26mm	0.26mm	0.26mm	0.25mm	0.28mm
Emissions	TCO 1992	MPR II	MPR II	TCO 1992	MPR II
Max consumption	110 W	110 W	125 W	100 W	130 W
Suspend consumption	< 30 W	< 8 W	< 30 W	< 30 W	< 30 W
Off consumption	< t5 W	< 6 W	< 8 W	< 1 W	< 8 W
On screen display	●	●	●	●	●
Size/position control	●	●	●	●	●
Pincussion control	●	●	●	●	●
Trapezoid control	●	●	●	●	●
Rotation control	●	●	●	●	❍
Preset colour temps	2	3	3	5	5
Dimensions (whd)	410 x 429 x 465mm	412 x 422 x 415mm	410 x 406 x 425mm	372 x 406 x 405mm	407 x 424 x 450mm
Weight	22 kg	21 kg	20.5 kg	15 kg	20.8 kg
RRP	£599+VAT	£575+VAT	£695+VAT	£529+VAT	£799+VAT
Typical street price	£499+VAT	£536+VAT	£520+VAT	£410+VAT	£550+VAT
Contact	Hitachi Business Systems	Iiyama UK	Mitsubishi Electric	NEC UK	NEC UK
Telephone	0181 849 2000	01438 745482	01707 278614	0645 404020	0645 404020

KEY ● Yes ❍ No

MONITORS TABLE OF FEATURES 3

Manufacturer	Nokia	Nokia	Panasonic	Panasonic	Philips
Model	447V	449M (092)	15MM	17MM	Brilliance 15A
Visible tube size	397mm	345mm	355mm	410mm	352mm
Speakers	2 + 2 W	❍	2 + 2 W	2 + 2 W	2.5 + 2.5 W
Microphone	❍	❍	●	●	●
Plug n Play	❍	●	●	●	●
Horizontal frequency	31 - 64 kHz	30 - 62 kHz	30 - 69 kHz	30 - 69 kHz	30 - 66 kHz
Vertical frequency	48 - 100 Hz	48 - 100 Hz	50 - 160 Hz	50 - 160 Hz	50 - 110 Hz
Max bandwidth	90 MHZ	90 MHz	86 MHz	86 MHz	108 MHz
Dot pitch	0.28mm	0.26mm	0.27mm	0.27mm	0.28mm
Emissions	MPR II	TCO 1992	TCO 1992	TCO 1992	MPR II
Max consumption	150 W	100 W	120 W	120 W	100 W
Suspend consumption	< 30 W	< t30 W	< 30 W	< 30 W	< 15 W
Off consumption	< 8 W	< 8 W	< 8 W	< 8 W	< 5 W
On screen display	❍	●	●	●	n
Size/position control	●	●	●	●	●
Pincussion control	●	●	●	●	●
Trapezoid control	●	●	●	●	●
Rotation control	❍	●	❍	❍	●
Preset colour temps	1	5	2	2	1
Dimensions (whd)	427 x 430 x 483mm	370 x 370 x 398mm	374 x 383 x 407mm	438 x 418 x 438mm	404 x 334 x 398mm
Weight	19 kg	14 kg	15 kg	18.5 kg	13 kg
RRP	£549+VAT	£379+VAT	£399+VAT	£735+VAT	£350+VAT
Typical street price	£475+VAT	£325+VAT	£340+VAT	£685+VAT	£280+VAT
Contact	Nokia Monitors	Nokia Monitors	Panasonic	Panasonic	Philips Consumer Electronics
Telephone	01793 512809	01793 512809	0500 404041	0500 404041	0181 689 4444

KEY ● Yes ❍ No

MONITORS TABLE OF FEATURES 4

Manufacturer	Philips	Samsung	Samsung	Sony	Sony
Model	17B	15M	17GLi	15 sfII	17 sfII
Visible tube size	410mm	350mm	400mm	353mm	404mm
Speakers	1 + 1 W	1.5 +1.5 W	❍	❍	❍
Microphone	❍	●	❍	❍	❍
Plug n Play	●	●	●	●	●
Horizontal frequency	30 - 66 kHz	30 - 65 kHz	30 - 65 kHz	31 - 65 kHz	31 - 65 kHz
Vertical frequency	50 - 130 Hz	50 - 120 Hz	50 - 120 Hz	50 - 120 Hz	50 - 120 Hz
Max bandwidth	110 MHz	110 MHz	110 MHz	60 MHz	60 MHz
Dot pitch	0.28mm	0.28mm	0.28mm	0.25mm	0.25mm
Emissions	MPR II	MPR II	MPR II	MPR II	MPR II
Max consumption	110 W	80 W	100 W	100 W	130 W
Suspend consumption	< 15 W	< 15 W	< 15 W	< 15 W	< 15 W
Off consumption	< 5 W	< 5 W	< 5 W	< 8 W	< 8 W
On screen display	●	●	●	●	●
Size/position control	●	●	●	●	●
Pincussion control	●	●	●	●	●
Trapezoid control	●	●	●	❍	❍
Rotation control	●	❍	●	●	●
Preset colour temps	2	2	2	2	2
Dimensions (whd)	417 x 426 x 450mm	403 x 396 x 421mm	428 x 420 x 439mm	368 x 373 x 385mm	406 x 427 x 451mm
Weight	18.5 kg	16 kg	18 kg	13.8 kg	19 kg
RRP	£570+VAT	n/a	£599+VAT	£395+VAT	£649+VAT
Typical street price	£540+VAT	£291+VAT	£479+VAT	£300+VAT	£500+VAT
Contact	Philips Consumer Electronics	Samsung Electronics	Samsung Electronics	Sony Computer Peripherals	Sony Computer Peripherals
Telephone	0181 689 4444	0181 391 0168	0181 391 0168	0181 760 0500	0181 760 0500

KEY ● Yes ❍ No

MONITORS TABLE OF FEATURES 5

Manufacturer	Taxan	Viewsonic	Viewsonic	Wyse	Wyse
Model	Ergovision 730 TCO-S	15GA	17GA	WY-15e	WY-17e
Visible tube size	394mm	357mm	412mm	348mm	401mm
Speakers	1.5 + 1.5 W	2 + 2 W	2 + 2 W	❍	❍
Microphone	●	●	●	❍	❍
Plug n Play	●	●	●	❍	●
Horizontal frequency	30 - 69 kHz	30 - 69 kHz	30 - 69 kHz	30 - 68 kHz	30 - 68 kHz
Vertical frequency	50 - 120 Hz	50 - 160 Hz	50 - 160 Hz	50 - 100 Hz	50 - 100 Hz
Max bandwidth	86 MHz	86 MHz	86 MHz	85 MHz	85 MHz
Dot pitch	0.28mm	0.27mm	0.27mm	0.28mm	0.28mm
Emissions	TCO 1992	TCO 1992	TCO 1992	MPR II	MPR II
Max consumption	150 W	120 W	120 W	100	130 W
Suspend consumption	< 30 W	< 30 W	< 30 W	< 15 W	< 15 W
Off consumption	< 8 W	< 8 W	< 8 W	< 8 W	< 8 W
On screen display	●	●	●	●	●
Size/position control	●	●	●	●	●
Pincussion control	●	●	●	●	●
Trapezoid control	●	●	●	●	●
Rotation control	●	❍	❍	❍	●
Preset colour temps	3	2	2	1	3
Dimensions (whd)	411 x 424 x 462mm	374 x 383 x 407mm	438 x 418 x 438mm	358 x 382 x 405mm	411 x 419 x 424mm
Weight	18 kg	15 kg	18.5 kg	12.2 kg	17.5 kg
RRP	£695+VAT	n/a	n/a	£265+VAT	£474+VAT
Typical street price	£507+VAT	£359+VAT	£589+VAT	£249+VAT	£465+VAT
Contact	Taxan Europe	ViewSonic Europe	ViewSonic Europe	Wyse Technology	Wyse Technology
Telephone	01344 484646	0181 781 6986	0181 781 6986	01734 342200	01734 342200

KEY ● Yes ❍ No

On the CUTTING EDGE

Welcome to Cutting Edge, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs, with features keeping you right up to date with computing and the Internet.

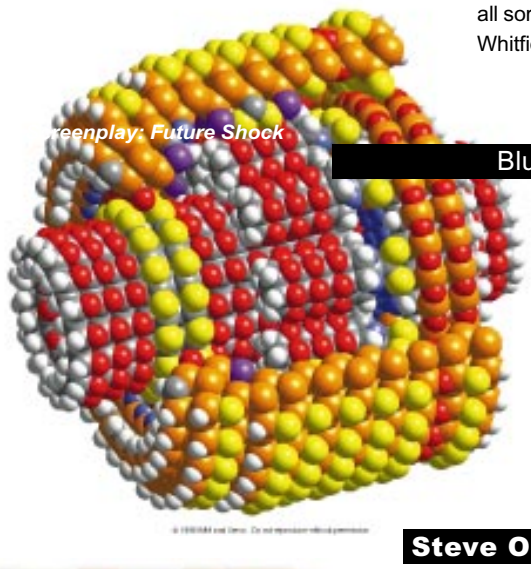
We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

PCW Online

PCW Futures

PCW Media

PCW Fun



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CUTTING EDGE

The empire strikes back

Microsoft is aiming to regain market dominance by setting standards for the Web. Tim Anderson assesses the products announced at the San Francisco developers conference.

Microsoft has Internet fever. Only last year analysts were saying that the company had no Web strategy. The MSN bulletin board was too expensive, slow and content-free. In the language wars, platform-independent Java from Sun was hailed as the way of the future.

Database giant Oracle began talking about network computers: cheap and simple Web workstations designed as a replacement for the PC. Users would depend on the Internet not only for communication but also as a file and application server, avoiding the need for local hard disks bulging with executables. Meanwhile, Netscape's Navigator dominated the Web browser market, catering for a majority of users with versions for Windows, Mac or Unix. For the first time since Windows ousted DOS on the desktop, the industry began to glimpse a Microsoft-free future.

The company's response has been energetic and decisive. In February it was restructured to create an Internet platform and tools division. Then in March, at the Professional Developers Conference (subtitled Building Internet Applications) in San Francisco, Microsoft laid out an armoury of Internet tools. In his keynote speech, Bill Gates explained the strategy.

"As a user, you should encounter one interface everywhere, for file access, for messages, for pages, and for documents. You shouldn't face different metaphors for browsing the Web and browsing your hard drive. There should be a single standard for graphics and multimedia, and you should expect complete integration of data and services, across both PCs and the Internet."

Several things follow from this. One is the idea of a unified browser, a single Explorer application for both files and Web sites. Another is that existing Windows technologies and applications should be Web-enabled, to make publishing documents on the Internet no more difficult than printing them, and to ensure that OLE works as easily across the Web as between Word and Excel.

A third implication is that HTML, the language of Web documents, should become the Windows standard as well. Microsoft has provided extensions to Windows together with an array of new tools to make all this possible (see page 224). The strategy is all-encompassing and includes specifications for Internet telephone and for virtual reality on the Web. For developers Microsoft has now brought together all its OLE and OCX Web technologies under a new ActiveX banner and made available a new Internet Developer's Kit (IDK).

One of the first active controls, this one is animated and displays different types and styles of chart. Hardly exciting, but it works

It's a beguiling scenario, but where does it leave the platform-independence of the Internet? Platform-independence is not just incidental: without it, initiatives like email, newsgroups and the World Wide Web would never have succeeded. If Microsoft's products work only with Windows, the Internet community will reject them. On the other hand, the company has to give Windows unique advantages that will preserve its dominance on the desktop.

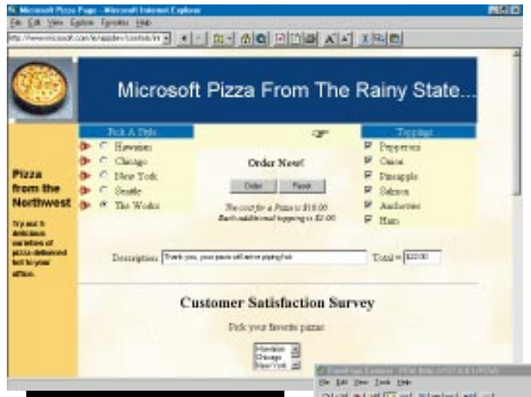
The result is a nod towards Internet standards but with the focus firmly on Windows. By licensing Java and submitting proposed HTML extensions to the World Wide Web Consortium, a specifications committee, Microsoft is showing some commitment to open standards. But on closer investigation, the commitment looks thin. For example, use of Visual Basic Script in Web pages will require VB Script-enabled browsers, which initially means only Microsoft's Internet Explorer.

While implementing VB Script on other browsers and platforms should not be too difficult, OLE presents a bigger problem. OLE is a feature of Windows, and one that only comes into its own on Windows 95 or NT. If Active controls catch on, there will be plenty of frustrated Web users. It all seems unnecessary since although OLE controls are easy to use, it is hard to envisage many situations where a Java applet would not do instead.

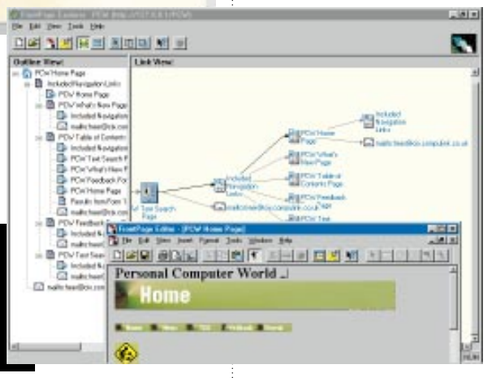
There is a stronger case for this proprietary technology on intranets, internal to a company, where compatibility problems can be overcome by network administration.

Nobody can now accuse Microsoft of not taking the Internet seriously. Indeed, it may have staked too much on a phenomenon that has grabbed public attention, but is still only a side issue for most companies. The commercial importance of the Web has yet to be determined. Microsoft is also carrying a significant financial burden by devoting so much development effort to products like Internet Explorer that are given away in an attempt to win market share.

It might just pay off. The Internet is still growing and intranets may well become pervasive. Although Microsoft is likely to stumble in some parts of its strategy, there is enough here to secure it a hefty slice of future Internet business.



This Web application depends on VB Script for its calculations — the pizza never arrived, though



FrontPage displays a Web site in hierarchical and graphical views, with double-ckick access to its own HTML editor

Internet Explorer

Internet Explorer started life as a version of NCSA's Mosaic, once the dominant Web browser, for bundling with the Plus add-on pack for Windows 95. It soon became clear that Microsoft was not going to let Netscape walk away with the browser market, as Explorer version 2.0 and 3.0 followed in quick succession.

This third version, in beta at the time of writing, is the first truly distinctive Internet Explorer, adding support for Active controls and Visual Basic Script as well as for the obligatory Java applets. Another key feature is support for Document Objects, first seen in the little-used Office Binder. This allows Internet Explorer to host a document belonging to another application, similar to OLE in-place editing but with the whole browser page taken over by the Doc Object.

Eventually Microsoft intends to integrate Internet Explorer with the file management Explorer, so that all Windows users will get it whether they want it or not. In combination with the Doc Object technology, this could allow you to do all your Web browsing, file management, and document creation and editing, without ever leaving Explorer.

Office for the Internet

To exploit the market dominance of its Office application suite, Microsoft has released a set of Internet Assistants which convert documents in Word, Excel or PowerPoint into HTML versions ready for loading onto a Web site. There's an Internet Assistant for Access 95 which converts data into HTML tables, and another for Schedule Plus.

PowerPoint users can also use the ActiveX Animation Player, which shows PowerPoint's animation, sound and special effects. In Navigator 2.0 or Internet Explorer 3.0, which support inline playing, the presentation will appear seamlessly within the browser. There is limited Macintosh support, but users on other platforms such as Unix cannot view the ActiveX presentations.

Front Page and Internet Studio

A recent Microsoft acquisition was Vermeer Technologies, whose FrontPage product is now to be integrated with Microsoft Office. It is an HTML authoring tool that goes further than most competitors by allowing a whole Web site to be visualised and navigated through the FrontPage Explorer.

Double-clicking a Web page in Explorer opens up the FrontPage editor where content can be edited without resorting to raw HTML code. FrontPage also comes with a personal Web server so that sites can be tested on a local PC.

Digital Signatures

The IT industry is nervous about viruses and has yet to be convinced that Java is really safe. If Java may be risky, what about Active controls, unrestricted executable components that are downloaded to a user's PC? Microsoft does not pretend they are inherently safe but has a response in the form of the Digital Signature initiative. It works like this. A company that develops executable code for the Internet obtains a digital certificate for that code from a third-party authority. The vendor then signs the code by encrypting the certificate into the executable, using a private key. When the user tries to download it, the browser decrypts the signature using the vendor's public key. If it checks out correctly, the user will know the source of the code and can decide whether it is safe. If certified code proves suspect, it should also be possible to trace the supplier. The process is supported by the WinVerifyTrust API, an extension to Windows.

This initiative will not have an easy ride. It is an added expense and an administrative burden for developers and vendors. Further, there is concern that secure encryption of code may not be legal under current US security legislation. Finally, one or two rogue Active controls, created by hackers who somehow steal keys or fake certificates, could undermine confidence in the system. Such a thing is meant to be impossible, but security-conscious corporates will take a lot of convincing.

CUTTING EDGE

NT 4.0 Server and Workstation

Microsoft is aiming two NT products, to be released later this year, squarely at the Internet and intranet market.

The NT 4.0 Workstation, which incorporates an improved Windows 95 front-end, is to be shipped with Internet Explorer 3.0. It will take advantage of the ActiveX components and DirectX graphics system to allow NT to use audio, video and other multimedia capabilities over the Internet.

The NT 4.0 Server will come as standard with the Internet Information Server (IIS) Version 2.0, which will be installed automatically during setup. IIS 2.0 manages to make setting up and running an Internet or intranet site easy. It includes an Internet database connector wizard which allows you to set up Web pages that can interact with NT or any other databases connected to the network. It also has full CGI capabilities and adheres to the Internet Server API (ISAPI) standard. The server can be administered entirely over the Web.

The NT 4.0 Workstation will include peer Web services, enabling users to set up their own small-scale Web servers from their desktops. Microsoft hopes it will increase the need for easy-to-use HTML authoring tools.

During the summer Microsoft also plans to make available the ActiveX server, allowing fully interactive ActiveX applications to run from an NT server.

Mark Prigg

The puzzle is that Microsoft has been working for some time on a home-grown product, originally called Blackbird. The initial release of this tool for authoring pages destined for the Microsoft Network was cancelled, and Microsoft announced that it would be converted to work with HTML pages, under the new name of Internet Studio. An early version was previewed at the March Internet conference, but it is unclear how or why FrontPage and Internet Studio will co-exist. A reasonable assumption is that adapting Internet Studio to work with HTML is taking too long and that FrontPage was bought in as a quick-fix solution.

Programming tools

For the developer Microsoft's Internet strategy consists of a mass of extensions to OLE and the Windows API, to make Windows an integrated Internet platform. This is the lump of technology known as Sweeper or the Active Internet Platform, and it includes ActiveX controls, Document Objects, unified browsing, Internet protocols like FTP and Gopher, and the Internet Server API, or ISAPI. Developers will be helped by extensions to the Microsoft Foundation Classes, some already available and some in preparation.

Visual Basic script is part of Internet Explorer 3.0 and Microsoft has made the source code available in the hope that third parties will implement VB Script on other browsers and plaforms. Like Java, VB Script is made safe by the omission of file input and output and has no means of calling the Windows API. At its simplest, VB Script is a way of embedding VB code into HTML pages so the browser can perform calculations or respond to choices. VB Script can also automate Active controls embedded in Web pages, but not external OLE controls. Java classes are automatically exposed as if they were Active Controls, so VB Script can integrate Java with OLE.

Another bonus for Visual Basic developers is the Internet Control Pack, a generous set of OLE controls offered free for download. The HTML control gives drop-in Web browsing capability to any development tool that supports OCXs. Other controls enable use of the TCP/IP network protocol via Winsock, reading and posting to newsgroups, file transfer via FTP, and Internet mail.

A final twist is that Microsoft has a licence from Sun to create a Windows reference implementation of Java. There will be a development product called Jakarta which will integrate into the Development Studio environment also used by Visual C++.

Internet Information Server

Once known as Gibraltar, the Internet Information Server is Web server software for Windows NT 4.0 (see box, above). IIS supports ISAPI, a set of extensions to the Windows API which developers can use instead of the traditional and less flexible Common Gateway Interface or Perl script.

IIS is a free download, although Microsoft charges a substantial £2,495 for the add-on connector that allows Web access to SQL Server databases. The Internet Information Server sits comfortably alongside SQL Server and Exchange Server to create a comprehensive set of back-end components.

PCW Contacts

http://www.microsoft.com/icp/
http://www.microsoft.com/INTDEV/

CUTTING EDGE

C hear

Steve Oualline, programmer *extraordinaire*, spoke to PJ Fisher about programming, the Internet and why Microsoft produces junk software.

AT THE TENDER AGE OF 11, Steve Oualline discovered programming. Since then, companies such as Motorola and Hewlett-Packard have benefited from his experience, as have many hundreds of students.

PJF: *Are there really highly religious beliefs in the "correct" way to program? Do you have specific rules?*
SO: While there are religious wars over ways of doing things, I believe it's better to just use a common style. I use procedures which make programs clear while others use things that don't: one of which is the Microsoft notation, also called the Hungarian notation, but I don't like to discourage a race of people; I'd rather just discourage Microsoft. That was a case of re-inventing the wheel and making it square.

But most of the time it's not a matter of which style you use, but getting people to use a good style and sticking to it. One company got a style guideline but forgot to give it to the programmers!

PJF: *What kind of qualities does a good programmer need?*
SO: Think before you do. I have had some programming assignments where it's taken me two days to figure out what the students are trying to do.

We have two problems right now: one is to get programmers to realise that style is very important; the other is to get management behind producing quality, and what it takes to produce quality. The biggest impediment to quality is the management structure.

PJF: *Including companies you have worked for?*
SO: Yes — but most companies in general. There's always a tendency to want to make money, which in most cases is good. But there are better ways of doing things. At O'Reilly, authors are made to read manuscripts to a group meeting. You learn a lot that way. You get a better writer out of that.

In my first book I used the word "that" when I shouldn't have. O'Reilly gave me back a manuscript and said "fine, just put in these changes." I swear there were 10,000 "thats" which I had to edit out — that is not a mistake I have repeated.

With programming it's the same thing. You get five programmers, you go through the code and you explain to them where they could have done things simpler or better. It will improve that piece of code and it will improve the programmer, but management tends to see it as taking five programmers out of circulation for an hour and delaying the product. It's hard for them to see the longer-term benefits.

PJF: *As a teacher, does it seem to you that programming is still considered a "cool" thing to do? What's the attitude among the people you train?*
SO: The students I see in San Diego have been affected by major downsizing in the defence budget. These people are saying, "I know how to make bombs and torpedoes but I need to learn a skill so that I can survive." In the retraining business, the vast majority of people I see are in it because they think there is money there. But there's still what I call the Midnight Programming Society; the people willing to stay in front of the computer between midnight and three o'clock in the morning. The hard-core hackers — programming for the sheer joy of it.


Steve Oualline

PJF: *Are they the best?*
SO: Yes. They are generally the people who can get 110 percent out of the machine. The vast majority I see have learned enough to get a new job but then unfortunately stopped learning. The people who are the best are those who like to "play with their software". I know of at least one company that has built into its structure time for their engineers to play with software. They are given "G-jobs" (short for "gee whizz") something that people want to do for fun.

PJF: *You started programming at the age of 11. Is it a young person's game or can people pick it up later in life?*
SO: Yes. It's not necessarily the programming that's hard, but the attitude. You need a combination of curiosity and persistence — that will get you very far in programming.

If you have the persistence, if you want to go in and see how things work, if you say "I'm going to try this because it's new", and if you are willing to take apart your PC to see how it ticks — then you could be a programmer.

PJF: *C++ has become quite topical lately, mostly because of the hype surrounding Java. What do you think of the hype? As a programmer, you must have a clearer view of Java.*
SO: I am still on the "wait and see" list. This is about the fifth product that is going to save the world. We've had structured programming, artificial intelligence, expert systems, object-oriented programming and now we are on Java. This week, it's going to save the world, next week it's not, and then the week after something else is going to save the world. Let's wait. It's so new that the people who are saying it's going to save the world haven't got much beyond "Hello World".

PJF: *Why has it been so hyped? Why is it different from other things you mentioned?*
SO: The main point is that it's an interpretive language designed to be portable across the Net so that it can be used in web pages. There will be a programming language for the Web; whether it can break out of the Web remains to be seen.

Programming languages need to learn from experience. C++ is still learning, it's still not stable. Java is going to take an evolution to get it right. The only language that didn't learn was ADA, mostly because of the defence environment from which it was formed. That language is still very much controlled by the Defense Department, whereas everything else is controlled by the market.

PJF: *Why does so much programming and software development happen in America and so very little elsewhere? What does the US have that the UK doesn't? Is it the education system? The military budget?*
SO: I don't know too much about the UK but software is still in its infancy and America tends to foster a more entrepreneurial spirit than the Japanese, for example. They foster a group mentality. As students they tend to do their homework in groups so that you will get the same answer five times. But they don't allow for an individual to say "you're all wrong and I'm going to prove it".

Take recent events: a guy told Microsoft that the Internet was the way forward and that he was going to form a company and build a browser. Microsoft said fine, but we are going to create our own proprietary network and it's going to stop the Internet. Well, we know what happened next!

I'm not sure it's the education system. It doesn't prepare programmers very well, it teaches more conformity than experimentation.

The people who come out of the system best are the ones who ducked class and played around with computers instead…

PJF: *…like Bill Gates. Has he built an evil empire that produces junk software or has it been good for the industry?*
SO: You have to study them. They are good and bad, and yes, I think their software is junk. But the real question is, "Is junk software bad?" Much to my surprise, the answer is no, because people pay an awful lot of money for their software and aren't too upset by the fact that it is extremely slow or buggy.

But Microsoft's monopoly of the OS market and the way it uses that to subsidise its competition with its smaller rivals is wrong. Some of its techniques of putting secret interfaces in the OS are wrong: they have undocumented interfaces in there that only other Microsoft programs can use.

For example, when the OLE standard was published, two days later Excel could use that with Word. Well, no-one could develop something that fast unless they had advance information. Drag-and-drop was another case: that interface remained unpublished until after Microsoft products were using it. There is supposed to be a "Chinese wall" at Microsoft HQ between the OS department and the applications department, That just does not exist! No-one seriously believes that. And they still get money from DOS licenses to subsidise other products.

PJF: *But is that unfair, or just good business?*
SO: It's considered unfair if you have a monopoly which is used to subsidise other things. As far as the justice department in the US is concerned, that is unfair, and they keep on talking to Microsoft about it.

> *"It's not necessarily the programming that's hard, but the attitude"*

PJF: *They always seem to be talking to Microsoft.*
SO: I wish they would talk a little harder. Microsoft is going too far in that department. They have done very well in selling WPs and spreadsheets, partly by writing some good software and partly by subsidising it. I think where they have fallen down badly is in the networking environment and multitasking operating systems. Microsoft Windows claims to be multitasking — well, try changing from one window to another and it's time for a tea break.

PJF: *But is it getting any better, though?*
SO: With Windows 95 Microsoft could afford to massively beta test their software and feed that data back into products that will run on multiple platforms, and Windows 95 did solve the configuration problem. Plug-and-play now installs almost everything automatically. But I'm sure most people have found that the difference between "almost" and "everything" is still there!

A lot still needs to done. The security is laughable. Got a system based on NT or Windows 95? You'd better keep it locked up, if it's on the network. Let other people onto the network, they've got the files.

PJF: *So what should you use?*
SO: Unix has solved the networking problem and it's fast. I have an old Sun 3.0 from 1988 running at 20MHz and I've compared it to a 66MHz PC system running Windows. I always thought the Sun was faster, but benchmark tests proved that not to be the case. But you can't tell. It comes down to the software: when you change windows on the Sun, they change.

The joker in the pack is Linux. It's pretty decent quality, it's essentially free, documentation is getting abundant because people like me are writing it, it connects to the Internet, and you can now get commercial software like WordPerfect. It's biggest drawback is still configuration but companies like RedHat are working on that and it will begin to approach the ease of installation of Windows 95.

The interesting thing about free software is that it has much better support and seems to run much faster than the commercial stuff. The size of the Linux development team around the world can easily rival some of Microsoft's teams, but the interesting thing is that none of them are getting paid.

PCW Contacts

Steve Oualline is the author of *Practical C++ Programming* and *Practical C Programming*. Both are published by O'Reilly & Associates.

Http://www.ora.com

PCW Illustration by Miles *Cole*

net.newbies

Getting started on the Net: what to do, where to go

These pages are designed to be an easy-to-use reference guide to the Internet for the novice.

So what is the Internet?

The Internet consists of millions of computers interconnected in a global network. The number of users is difficult to measure, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and growing.

What about this World Wide Web then?

It is *not* the Internet. It is a service on the Internet which uses special software known as Web Browsers (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. About 15 million people around the world have access to the World Wide Web.

Sounds great. What do I need to get on?

A PC of almost any age can be connected to the Internet as long as you can plug it into a modem. You don't even need to be able to view graphics on your machine to look around (although it helps).

A modem allows your PC to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2,400Kbps to more than ten times that. When you are using the Internet, the speed at which things work is more likely to be limited by the speed of your modem than by that of your computer. Buy the fastest you can afford. An old 2,400Kbps model is fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400Kbps is vital. Fortunately, these have plummeted in price over the past few years and now cost as little as £100. If you have the money, go for a 28,800Kbps V.34 modem. Over time, you'll recoup the added cost by reducing your phone bills.

Okay, I've got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a "service provider" comes in — you have to subscribe to one if you want to get online.

Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company.

The bigger service providers will have the numbers you dial, PoPs (points of presence), scattered across the country so you only have to dial a local number.

If there's no company near to your home which offers Internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn't matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone numbers is available in the panel below. For more details, have a look at the supplement which was banded with the January issue of PCW.

Full Internet access, which allows you to use email and Internet services for any amount of time, limited only by the size of your potential phone bill, costs more, currently between £8.50 and £15 per month. There are dozens of companies offering this kind of Internet access, none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer a more personal service or a better selection of access software.

Why don't I just join CompuServe?

Or you could try AOL, Europe Online, UK Online and MSN who all now offer Internet access and also have a large number of services of their own to which only their subscribers have access. These services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £5 and £10 per month, plus a charge per hour if you are online for more than a set number of hours in that month. But as the market becomes more competitive, prices continue to fall.

Demon Internet is the best known and most popular of the standard Internet operators and is certainly more newbie-friendly than it used to be. Perhaps better for the raw newbie is Easynet or UK Online. The latter is a special case; a cross between an Internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the Internet, partially "censored" to make it safer for children to browse, plus access to online magazines and other services.

Any good service provider should provide you with appropriate access software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

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net.news

Candace Johnson of Europe Online

Europe Online, *online*

EVEN THOUGH IT MAY BE LATE, European families will love it. That was the official line at the UK launch of Europe Online at a glitzy affair in London's Covent Garden.

The Luxembourg-based operation is making much of its European origins and local content. And unlike rivals, its service is based wholly around Netscape Navigator 2.0.

"We wanted a service that reflected the rich cultural diversity of Europe. People will be able to communicate with each other no matter what language they speak," said Candace Johnson, founder of Europe Online.

She dismissed suggestions that Europe Online may have given AOL a head start in the UK by delaying its launch to Spring 1996.

"We are 100 percent local from day one. We are not taking an American product and adding one or two British specialities. We are providing what we think people here will want to use. It is a product for the market in Europe."

The service uses a modified version of Navigator 2.0 and all areas take advantage of the browser's HTML extensions, including frames and Java. It will offer full Internet access as part of its pricing, including news and email provision plus exclusive access to Europe Online's editorial content.

The top level pages will always be available to all Web surfers but the rest of the site will be for subscribers only.

Europe Online is heavily against proprietary software such as that used by CompuServe or AOL and is convinced that a Web-based service is the way forward. "The exclusive role of online services should be to make life easier in terms of structuring and organising the chaos of the Web," said Jurgen Becker, CEO.

Prices start at £3.95 per month for three hours access and £1.85 per hour thereafter. An introductory trial offer provides one month's free access.

Europe Online www.europeonline.com ● 0800 10 66 10

Expresso Java — *just in time*

Users of Netscape can look forward to faster Java executions with the announcement of Borland's AppAccelerator — a "just-in-time" Java compiler which compiles Java applets as they are downloaded by a client browser.

Netscape plans to embed the compiler in future Windows 95 and NT versions of its Navigator browser which, Borland claims, will make Java executions between five and ten times faster.

Other vendors developing just-in-time compilers include Sun, Symantec and Microsoft.

www.borland.com

Webbed fingers in the Workshop

DEVELOPMENT PLANS ARE underway for Specular's 3D Web Workshop for Windows, now that the Mac version has just launched. The 3D Web page design and layout package, previously codenamed "Fireball", is predicted to be ready for the PC by December 1996. The Workshop is an integrated studio package made up of Specular's TextureScape, LogoMotion, WebHands and Adobe PageMill.

TextureScape's Web edition creates background patterns and bevelled buttons while LogoMotion can generate 3D elements and animations.

Specular's WebHands are pre-made graphics that can be fully edited and customised with the Web Workshop tools to create original artwork for Web pages. There are over 1,000 WebHands: from 3D buttons and titles to tileable background images, to preset camera styles for 3D text and object viewing, as well as animations.

QuickTime movies can be incorporated right onto the Web page and LogoMotion's animation capabilities have been tuned for Macromedia Shockwave. Specular claims no HTML knowledge is required.

Joanna Scott

http://www.specular.com

Spider, man

TURNING YOUR WINDOWS 95 desktop into a mini Web server could become a reality with the release of software currently under development at Microsoft. Codenamed "Tarantula", it is designed to let NT and 95 users publish information over the Internet, or intranet, direct from their desktops.

The technology is designed to work with Nashville (the upgrade to Windows 95) and is based on a cut-down version of Microsoft's Internet Information Server (IIS — see *Focus*).

Users won't have to wait until Nashville is released in 1997 however, as Tarantula will be included in the Microsoft Internet Plus! pack due for release in the Autumn.

www.microsoft.com

Not only, but also... PageMill for Windows

ADOBE HAS ANNOUNCED VERSION 2.0 of PageMill, its successful Web editing package. Formerly a Mac-only product, it will be simultaneously released for Windows 95, NT and the Macintosh and, it is hoped, goes some way to answering criticisms levelled at the first version.

Undoubtedly easy to use, it missed out on supporting the extensions to Netscape 2.0 and HTML 3.0. New features include WYSIWYG table creation, integrated viewing and editing of HTML and inline support for movie and sound files. For the first time, table editing will include support for nested tables making it easier to create "newspaper-style" Web pages.

However, according to Adobe, multimedia support only extends to QuickTime and Adobe PDF files and no mention is made of either Java or Shockwave support, or Microsoft Internet Explorer extensions.

Adobe claims that over 100,000 copies of PageMill have been sold on the Macintosh platform and hopes to repeat that success in the Windows market where it will compete against InContext Spider and Microsoft Front Page.

PageMill 2.0 will be available by the end of July, at around £75, with upgrades available from version 1.0.

Adobe 0131 451 6888

http://www.adobe.com

Plug-in to this

USERS OF MICROGRAPHX ABC Graphics Suite will soon be able to view and interact with graphics created with the package inside Web browsers. A plug-in for Netscape 2.0, currently available from the Micrografx Web site, is the first part of the QuickSilver pack which will eventually support both Netscape and Microsoft browsers.

QuickSilver uses "object graphics" designed to simplify hot-linking of graphics for Web sites. Graphics can retain links and other dynamic actions even when transferred from one site to another, or kept in a graphics library. QuickSilver will support all formats supported by ABC Graphics Suite.

"While companies are working with static graphics today, it's our belief that the use of active or interactive graphics is a logical choice for customers in the future," said Micrografx.

www.micrografx.com/quicksilver.html

We're rich!

WHAT BEGAN AS A college project has caused yet another Internet sensation on Wall Street. The Yahoo flotation almost immediately valued the company at around $1bn before it fell back later as trading closed at $33 per share.

In the process, Yahoo's founders, David Filo and Jerry Yang, who started Yahoo while at Stanford University, have become instant paper millionaires.

The fact that Yahoo lost $643,000 on sales of $1.4m in its first ten months did not seem to dampen enthusiasm on Wall Street — nor, indeed, did the inability of anyone to figure out exactly how Yahoo might make its money in the future.

Yahoo is now partly owned by Japanese software house, Softbank, which has boosted its stake to 37.02 percent.

www.yahoo.com

Net Opinions

The fight for font-friendly Web browsers blazes and presents a standards issue which should not be fought out in the marketplace.

WE REPORTED, LAST month, Netscape and Microsoft's ambitions to make their Web browsers font-friendly. That is, to liberate them from the limited screen fonts currently available which often clash with advanced HTML formatting.

Once Web designers start specifying real typefaces on their pages, just as graphic designers do now, the Web will make the next leap forward as an alternative publishing medium.

Microsoft took the lead by supporting a limited range of TrueType fonts through simple HTML tags, but of course you must be using Internet Explorer 2.0 to see pages designed this way. And it is developing ways of downloading fonts to client PCs.

Adobe (and its partners, Netscape and Apple) is working on a technology based around PostScript, the lingua franca of the newspaper and magazine industries. And so another standards war is underway on the Web.

Some years ago, both Microsoft and Apple tried to break what they saw as Adobe's monopoly of the font market by developing the TrueType standard that dispensed with separate screen and printer fonts. But PostScript was already an accepted standard and the publishing world wasn't about to abandon its investment in PostScript technology. TrueType failed to break through in the professional markets.

Microsoft now believes it has an advantage. Millions of TrueType fonts are preloaded and used on a daily basis on Windows PCs around the world, mostly for mundane office documents and reports. Of course, most people view the Web on exactly the same PCs — not surprising therefore that Adobe should line up with Netscape to try and head-off a TrueType-dominated Web. For its part, Apple lost interest in TrueType some time ago and in its current mood is probably happy to fight Microsoft over anything.

In reality, this is a serious standards issue that should not be fought out in the marketplace. The HTML standards committee should take the initiative and work with all parties to define what it should be.

Netscape, Microsoft and Adobe have it in their power to create a digital publishing standard for the next millennium. They should seize the opportunity to build a font architecture that can work within HTML and be available, free, to any browser on any platform.

A font standards war, on top of everything else, is in no-one's interest.

PJ Fisher

Surfwatch under new board

MOSAIC DEVELOPER, SPYGLASS, HAS purchased SurfWatch in a $12.6m deal. The employees and operations of SurfWatch will become a division within the ambitious Web technology company.

SurfWatch was the first filtering software for the Internet and has proved popular with parents wishing to regulate what their children find on the Web and newsgroups.

However, Spyglass sees potential for filtering technology in other markets such as the newly-emerging Intranet.

"The acquisition of SurfWatch will not only improve our component technology offerings, but its name recognition and electronic distribution channels will improve our ability to tap corporate customers," said Spyglass.

Continuing on the acquisition trail, Spyglass also purchased OS Technologies, a company that develops Web conferencing technology.

The moves come at a time when Spyglass is seeking to firewall itself from the browser war, which looks like being a straight fight between Microsoft and Netscape (see *Net Opinion*). Instead, Spyglass is looking at the corporate market, wishing to move from off-the-shelf Web browsers to internal corporate Web development. A deal with software giant Computer Associates and Spyglass will develop a combined Web server and database package.

Also aimed at corporates is the new Web Technology Kit (WTK), a multi-platform development kit which will enable corporate developers to create bespoke Web software and applications.

Current technologies supported include JavaScript, VBScript, ActiveX and OpenDoc. Prices start at around $25,000 for a 1,000-user licence.

Spyglass Mosaic is based on the original Mosaic Web browser developed by the NCSA at the University of Illinois.

www.spyglass.com

Electric libraryland

SITTING AROUND IN THE British Library could soon be a thing of the past for researchers when the library's vast catalogue is made available on the Web. Blaise Web is a new service which uses search and database technology to give access to 17 million bibliographic records.

Based around the existing Blaise Line online service, the new service will be subscription based.

Books or documents can be ordered for retrieval via the Web using simple forms. Subscription charges have not yet been set.

British Library 0171 412 7111

"Ain't no net small enough..."

THE FedEx SITE HAS BEEN one of the most successful sites on the Web. It allows customers to track the progress of packages across the world. Now its major rival, DHL, has announced some enhancements to its own site which includes, unsurprisingly, package tracking.

By typing in the ten-digit airway bill number and country of origin, users can see whether the parcel has been delivered and who signed for it. Parcels still in transit will reveal shipment status and scan points throughout the journey.

www.dhl.com

Net.surf

Pantone

● Colour gurus at Pantone have launched a new site which can only be described as… colourful.

Aimed mostly at the design and publishing industries, with its guide to Pantone's range of products it also serves as a useful guide to colour theory for anyone who wants to know more.

Its most interesting revelation is that black on yellow is the best combination for business documents and not, as you might imagine, black on white. People are more likely to remember what they read using that colour combination — I must try that on my Web site.

http://www.pantone.com

In the Pulpit

● This is one of the best-designed Web sites I have seen for a long time. Cool and *very* restrained, Pulpit is published by Ruairidh Lappin Associates in association with Unipalm Pipex Pulpit and focuses on design.

It's a bit like an online version of *Blueprint* magazine except that the publishers want Pulpit to "shake off the elitist tag normally associated with design".

In the first online issue you can read about the Wagamama noodle bar chain, a typographic interpretation of "Pulp's Common People" (actually the weakest part of the site) and why Paul Smith loves to have Noel Gallagher and Sir Norman Foster in adjoining cubicles.

www.pulpit.com

Underground press

● I have found a new(ish) US magazine called *Internet Underground* that's worth checking out. In concept it's a bit like *.net* except that it's funny, kooky and genuinely cool. And *.net* isn't any of those things.

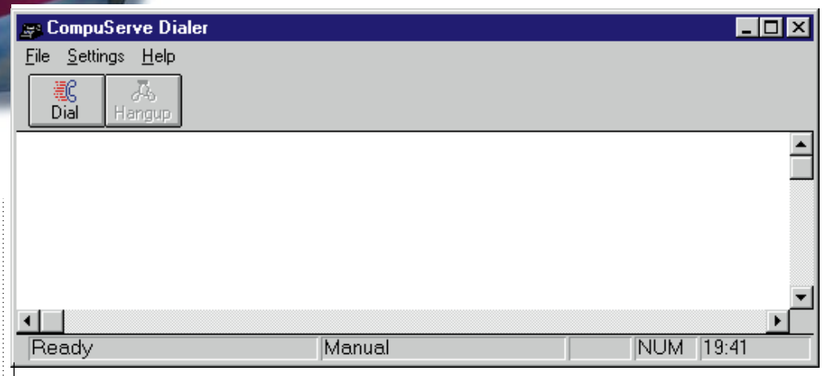
The latest issue features the unofficial Markoff Mitnick Shimomura FAQ. *Internet Underground* costs £3 in most major cities.

001 708 268 2498

www.underground-online.com

net.answers

Lost on the Internet? Nigel Whitfield shows you the way to go.



CompuServe's Internet Dialler doesn't always co-exist very happily with other Internet software, due to a clash of winsock files

CompuServe at your convenience

Q. Is there a convenient way of having access to two ISPs from one PC? I find that I have to rename the -Winsock.dll- for CompuServe whenever I want access via Cityscape, and vice versa. Am I doing something glaringly wrong and is there a simple solution?

A. Depending on which providers you're using and what software you have on your system, you'll have varying amounts of difficulty, as some programs simply don't bother to check if you have already installed a copy of winsock.dll and replace your existing one with a new one.

CompuServe's software can be particularly bad at this, but there is a relatively simple solution, which is to make sure that the CompuServe winsock file is installed in your CompuServe directory (usually something like c:\cserve) rather than in your Windows directory. So, if you're installing both CompuServe and other Internet software, install WinCIM first, then move winsock.dll into the same directory as Wincim, before installing your CityScape software.

There are alternative solutions, however. If your provider will give you the details necessary to work with a TCP/IP stack of your choice — you'll need to know login details, what sort of authorisation is used, and addresses for your machine and a name server — then you could use a winsock that allows you to choose between different configurations more easily. For instance, the NTS stack included with software such as Turnpike can be configured with details for more than one provider.

You should also consider upgrading to Windows 95, as the Dial Up Networking facility can be used to create setups for more than one provider, and you can select which one you wish to use each time you connect.

It's important to remember, however, that not all Internet applications rely solely on the information provided by your winsock. For instance, your email program will have details of your account in its own configuration files, so it might not necessarily work properly if you're connected to an alternative provider.

Internet called to account over Linux

Q. I am intending to open an Internet account using my Linux system, the main benefit being the seamless and automatic mail and news collection. I can easily see how to do this with a UUCP-type account, but a TCP/IP account also allows telnet and FTP. The problem is that the providers I have spoken to seem not to know much about it, which is odd when Unix is the "native" Internet environment. My questions are:
1. Should I/can I use SLIP/CSLIP to simulate UUCP (my kernel level does not have dependable PPP)?
2. Do I have to have static rather than random IP addressing?
3. If my account is called ml@xxx.co.uk, does this refer to the provider? What then should my machine be called, given that some providers allow me to choose my own sub-domain name?
4. What mail/news transport should I use?
5. What are the essential attributes that a provider should have to allow the above?

A. Although many of the computers that make up the Internet may run Unix, providers themselves usually concentrate on the mass market, which means Windows and Mac, so don't be surprised if the help desk doesn't seem too clued up on Unix.

Taking your questions in order, you can certainly use an SLIP or a PPP connection to collect mail using UUCP. However, you won't find many providers who can support this as it will mean much more work for them, and unless you have a very good reason not to, you should collect your mail via SMTP or POP.

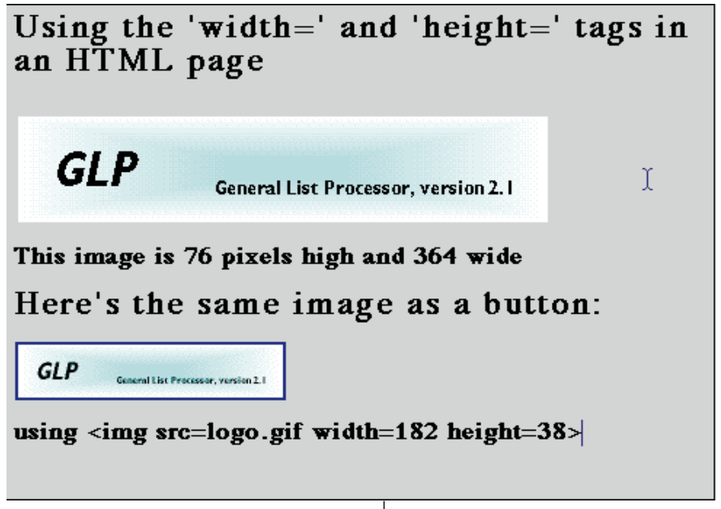
The choice of a fixed address or a random one doesn't matter too much, though if you're using SLIP it's much easier with a fixed address as there's no standard way of configuring your link automatically, whereas PPP is capable of negotiating the necessary options. However, depending on the TCP/IP software that you have on your computer, you may find that it's virtually impossible to make everything work reliably unless you have a fixed address.

Your computer can be called anything you like as long as it will respond to the address that's allocated to you by your provider, whether that's a fixed address or a different one each time you log in. For instance, although the node name in my Demon account is "stonewall", the computer itself is called "fags". That doesn't matter, as the PPP connection is still allocated the address given to it by Demon, so to the outside world I'm still "stonewall.demon.co.uk". However, as a rule, you'll have fewer problems if your computer's name is the same as the name of your account, and on many versions of Unix that's limited to eight letters.

The choice of mail and news software is quite a personal one, but when it comes to mail do check to make sure you have the most up-to-date version of programs: some old versions of sendmail, for instance, have serious security problems. Sendmail is very popular but not terribly easy to configure, and many people prefer smail instead. Another alternative is MMDF, which is very flexible but less widely used.

For news, there are a number of solutions. You can simply use an online newsreader, but if you read more than a few articles you'll be better off transferring them to your computer, so you'll have to decide between either C-News or INN, both of which are very popular. C-News is older and designed for much more than just the Internet; if you're starting from scratch, you'll probably be better off going for INN from the start.

Finally, when you're looking for a provider to use with a Unix-based system, you should ideally look for as many as possible of these features: a choice between PPP and SLIP (as you might not have the choice on your system), mail delivery via SMTP, and a fixed Internet address. None of



Same picture, different size. As well as helping your browser lay out pages, the extra image tags mean you can use the same picture for different things

these is strictly necessary, but they will make it much easier to set everything up.

The mail must get through — but with the right software

Q. My company runs a network with Novell 3.12. We use a mixture of WFWG 3.11 and Win95. We have Zetafax running via a single modem attached to one user, and we want to use the Internet for EMAIL ONLY in the same way.

We signed up with an Internet provider and registered our own domain name, and that's when our problems began. Our thinking was that we would load the Internet software on the same workstation and at two set times a day we would quit Zetafax and then send or receive mail.

We found it impossible to load the Internet software: technical help were puzzled until they realised that there was a conflict between it and Novell (TCP/Stacks, I believe). The Internet provider has been as helpful as they can but say that there is no solution and have offered to return our subscription.

Is there no other software that exists that will give us a solution? We only need the facility for email and we can't really set up a standalone PC, i.e. not on our network, as this would preclude other users (our Sales office, Accounts, Design etc) from sending and receiving mail.

A further complication is that having registered our own domain, we have included this on much of our Company literature and this has been sent to cusomers worldwide as an increasing volume of our production is exported. As a temporary solution to this, I have Eudora on my own home computer so that I can access the Company address through this.

A.There are a number of issues here. First, don't worry about the company name that you've registered as a domain. Even if you can't make it work with one provider, it's still registered and most providers will happily be able to take over managing it for you (the technical term is "delegation"). In the short term you should ask your current provider if they can arrange for an automatic response to be sent to any messages that arrive for your domain if you are unable to access it completely.

There is a large amount of software available that will let you connect a network to the Internet, depending on how much money you want to spend, and it should be possible to make a lot of ordinary Internet software work with a Novell network as well. For instance, both Netmanage Chameleon Sampler and Turnpike will work on a PC connected to NetWare, and both are capable of handling a number of different addresses within your registered domain so that you can have, for instance, sales@yourcompany.com and accounts@yourcompany.com. Given this, it's rather surprising that your provider said it wasn't possible.

In the case of Turnpike there's also a network version, and you can arrange for the received mail to be saved to a network drive so that it can be read by people using the offline part of Turnpike from any computer on the network.

However, you may also want to consider more sophisticated systems, which can provide you with email around your company as well. There are a number of these, including systems that can run on a Windows PC or on your Novell server, and the best way to get advice is to speak to a specialist consultant who can work out exactly what will suit your needs.

There are two issues that you need to be aware of, however. One is that some providers will charge you extra if you want to have mail available to all the users on your network, and you should check this before you decide to move to a different ISP.

Secondly, check to see if you can easily share a modem between Zetafax and other software: you may find that it's not very easy to make things happen automatically, and you'll have to have someone stop the fax software and start the Internet programs twice a day. This is certainly the case with earlier versions of Zetafax, which will not allow other programs access to the modem while the fax server is running. If you experience this problem, you should be able to resolve it using the latest Windows 95 or NT version of Zetafax.

Striving for the best graphics on the block

Q. I have been unable to find the solution to a simple graphics problem: that of specifying (in my HTML documents) that the graphics be "blocked off", so that the download of graphics, following that of my text, does not result in the jerking of the latter as a result of displacement on screen.

A. You're running into a problem with HTML, which wasn't designed to do many of the things that it's now used for; and with many browsers there simply isn't the facility to do anything about this problem.

However, there are some solutions. For instance, Microsoft's Internet Explorer has an option in its preferences that allows you to specify whether a page should be redrawn after each image is loaded, or after all images have been loaded. While this doesn't solve the problem completely, it goes some way towards it.

The best solution, which is supported by a growing number of browsers including NetScape, Explorer and NetShark, is to use extended image tags in your Web documents, which specify the size of the images that are to be loaded. When the browser sees these tags, it can reserve space on the screen and run the text round them, so that nothing will move when the images are fetched.

You can even use the tags to change the size of a picture, so that rather than having two GIF files for a log, for instance, you can simply tell the browser to display it "button sized" in some places — though remember that if you view the page in a browser that doesn't understand the extended tags, you'll see the image full size.

The extensions to the image tag are "width" and "height", and you can specify either the size of the image in pixels (which you'll be able to find out from your image editing program) or a percentage. For instance, this line would reserve the appropriate space for your picture on the page:

```
<img src=logo.gif
alt="Company logo" width=72
height=36>
```

and this can be used if you want to change the size. But remember, since it doesn't say what size the picture was originally, the browser won't know the size of the picture and you'll see text move around when the images are loaded:

```
<img src=logo.gif
alt="Small logo"
width="50%" height="50%">
```

PCW Contacts

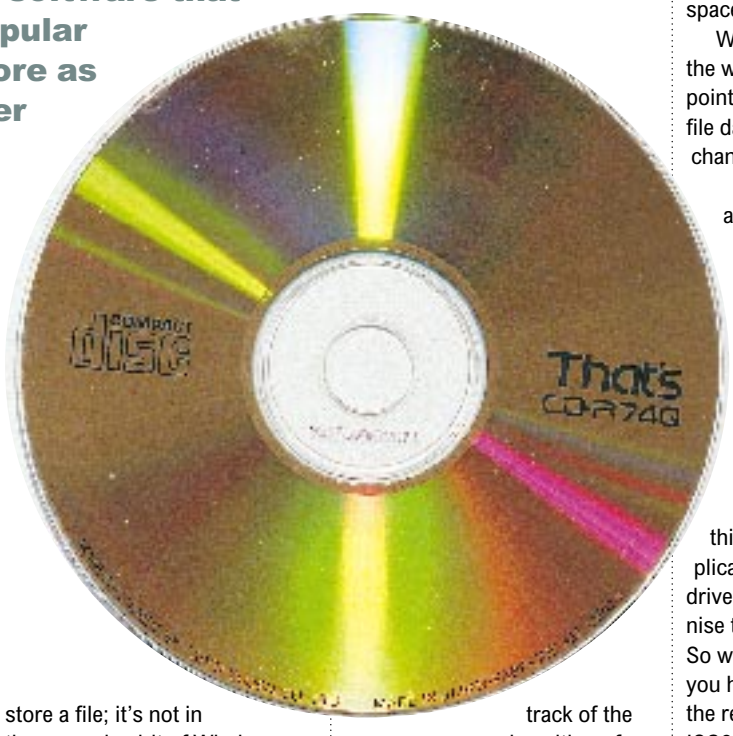
Nigel Whitfield is a freelance writer and maintainer of several Internet mailing lists. He welcomes comments via the address **nigel@stonewall.demon.co.uk**; if you have questions you'd like answered, please send them to **net.answers@stonewall.demon.co.uk**. Please note that a personal response to every query cannot be guaranteed.

CUTTING EDGE

Innovations

On the **record**

Sony is proposing software that will enable the popular CD-R format to store as much data as other PC media.



With a mass of new low-cost CD-R ROM drives poised to hit the market later this year, recordable CD has at last grown out of its audio roots. It is used to create either whole disc copies at one go, or in multi-session mode to store just a few very large files. One major defect of the format has gone largely unnoticed: the file space overhead used for each new recording session and the almost DOS-like working practices that it demands.

The CD-R's Table of Contents system is set up in such a way that each time a new session is recorded, the Table of Contents is rewritten, using up hundreds of kilobytes. If you are just recording a dozen or two dozen files out of the total 650Mb capacity, then it's not a major problem. But as CD-R drives enter the standard PC world, users will want to use the recordable CD as an extension of the hard disk, storing hundreds or thousands of simple files at different times.

If you attempt to use CD-R like that, after a couple of days the disk will be full of Table of Contents and very little in the way of useful data. On top of that, you don't really want to boot separate CD-R recording software each time you want to store a file; it's not in the general spirit of Windows.

So some more modifications are being made to CD-R. But this time it's not the hardware or media format that is changing, it's the software. With a system called CD-Recordable File System (CD-RFS), Sony is leading proposals to provide a standardised software solution to make CD-R appear to work in the same way as any other PC storage media, like a floppy or a hard disk.

The software driver comes in two parts, a File Manager and a Virtual Device Manager, and will work with any CD-R that supports packet recording, which copes with data in small chunks rather than finalised data files. The File Manager is a separate indexing system that keeps track of the name and position of each file on the disc. The Virtual Device Driver goes between the File Manager and the "real" Device Driver, adding address mapping capability that can fool the whole system into acting like rewritable media. With the VDD in place you can make changes to a file or even delete it.

The read/write CD-RFS software comes on a disc with the drive. Once loaded, it puts the CD-R on the desktop, just like any other drive. Files are transferred to the CD-R by simply "dropping" them in. Deleting and updating files works, as far as the user is concerned, in exactly the same way as with the hard-disk. What is really going on is that the VDD is constantly updating the CD-RFS File Manager and leaving the official Table of Contents alone.

To delete a file VDD just removes its name from the File Manager, so when you look at the disk it is no longer listed. To update a file, CD-RFS uses Explorer to add just the changed part of the file and adds a pointer to the File Manager. So if you make some minor changes to a large spreadsheet file, you only write the changes onto the CD-R rather than rewriting the whole thing, thus saving more disk space.

When it comes to reading, the whole file is read and the pointers look for the additional file data that contain the update changes, and insert them.

By using a CD-RFS disc on a PC with read/write software you have full access to all the files at any time. When the disc is "finalised", the File Manager information is placed into the Table of Contents and you have a normal ISO9600 disc, usable on any CD drive.

In its non-finalised state things are a little more complicated, as a multi-session drive will not be able to recognise the File Manager or VDD. So when a disc is first written you have the option of loading the read part of CD-RFS into an ISO9660 formatted part of the disc. Pass the disc on to someone else and the drive sees the CD-RFS read-only software and loads it into Windows so the disc can be read.

The beta CD-RFS software supports Windows 95, with other OS versions being worked on. Discussions are still going on with the major CD-R manufacturers to finalise the software so it incorporates other developers' ideas.

Sony sees this system as a route to selling more CD-Rs. It is treating it as an open system with no licence fees and seems to be welcoming the assistance of others to develop software using the same basic principles.

Tim Frost

Horizons

Pressing all the right buttons

Simulation software makes the task of testing products simpler and cheaper.

IN MY FIELD OF AUDIO AND video, we've been frustrated by the lack of commercial instrumentation available to probe esoteric phenomena such as digital jitter. This problem has been solved by the advent of virtual instruments (VIs), which simulate a "real" instrument panel with knobs, dials, pushbuttons and graphical displays and indicators that are all swiftly addressed via either a keyboard or a mouse.

Arguably the most flexible and widely-used system of this type is LabVIEW, a program development application produced and supported by National Instruments. LabVIEW is a graphical programming language with built-in libraries to cater for data acquisition, data analysis, processing, presentation and storage.

For example, with a general purpose data acquisition card performing analogue I/O, timing and digital I/O functions, it is possible to create a customised test station with a virtual Digital Multi Meter (DMM), oscilloscope and FFT analyser, all available on-screen at the click of a mouse.

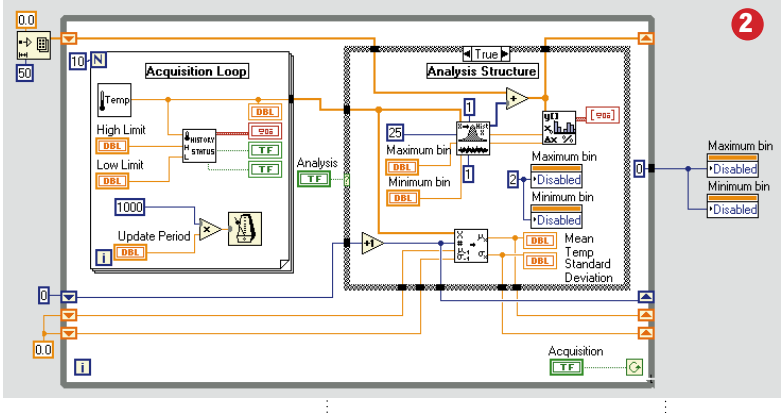


Fig 1 shows an example of a simple GUI, the front panel of a temperature-logging VI. This type of development package has a minimum system requirement of a 386/25 with 387 co-processor, though a 486 with floating-point capability and 8Mb RAM is strongly recommended.

Native versions of LabVIEW are available for Windows 95, NT and 3.1. Visa, GPIB, VXI, RS-232 and Data Acquisition (DAQ) libraries are available to call standard National Instruments DLLs and device drivers and acquire data from plug-in cards and/or external instrumentation.

In my own lab, flexible VIs have been developed to control various Hewlett-Packard signal generators, digital scopes and both HP and Roahde & Scharwz spectrum analysers which now act as computer-controlled signal sources and acquisition sites. Analysis of data is quicker and more thorough in the virtual environment of the PC.

VI programming is both hierarchical and modular; applications are divided into a series of tasks which, if necessary, are further sub-divided so that a complex application can be broken down into a sequence of simple sub-tasks.

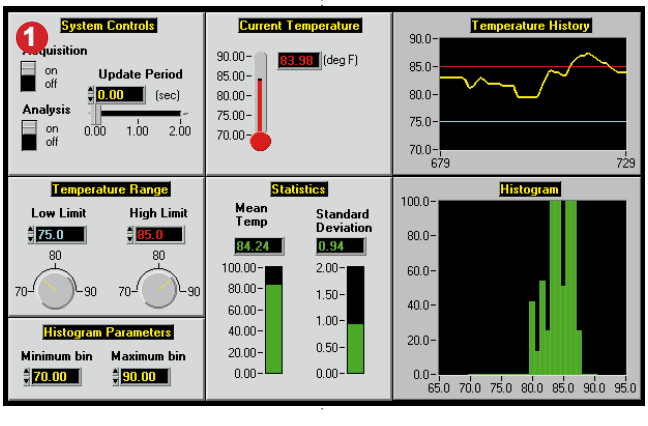
Sub-VIs are programmed to accomplish each sub-task and are then called upon by higher-level VIs when necessary. This optimises the management of system resources and makes the inevitable de-bugging of code that much swifter.

The programming language (G as opposed to C) employs graphical representations of conventional code with re-sizeable icons for While and For/Next loops, sequence and case structures. There are also formula nodes, for example, and highly versatile tools for dealing with clusters and multi-dimensional arrays of controls or data.

This "block diagram" is effectively the source code for the VI and looks rather like a pictorial solution to a programming exercise. *Fig 2* shows the block diagram for the temperature-logging VI as an example. Temperature data is acquired in the form of a 10-element array at a rate set by the update period within the For/Next loop. If the analysis boolean is true then the mean and standard deviation of the data, along with a histogram, is calculated within the Case structure. The results are passed to shift registers which return data to the beginning (the left) of the While loop within which the entire program is running.

In general, the sophistication and code efficiency of any VI is largely dependent upon the skill and experience of the programmer, yet development packages like LabVIEW remain incredibly versatile tools that are currently in use in areas as diverse as defence, medicine, education and electrical/mechanical engineering. Crucial to the programmer working within R&D or production, however, is the fact that the precise nature and execution of these instruments is now user-defined, as opposed to vendor-defined like traditional hardware instrumentation. In this instance, the software really is the instrument.

Paul Miller



PCW Contacts

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CUTTING EDGE

Bluesky

Tiny **science**

Voice-annotated sellotape: now there's a good idea. Sounds daft? It could work, if nanotechnology takes off.

Last Christmas, struggling at the eleventh hour with unwrapped presents and fumbling fingers, I had an idea: voice-activated sellotape. The tape comes off the roller, unsticky, and you coil it around the thing you need to wrap. On your command, it sticks. If it's twisted or unsightly you say "unstick". It obeys, and you try again. A crazy thought. But not for proponents of the emerging science of "nanotechnology".

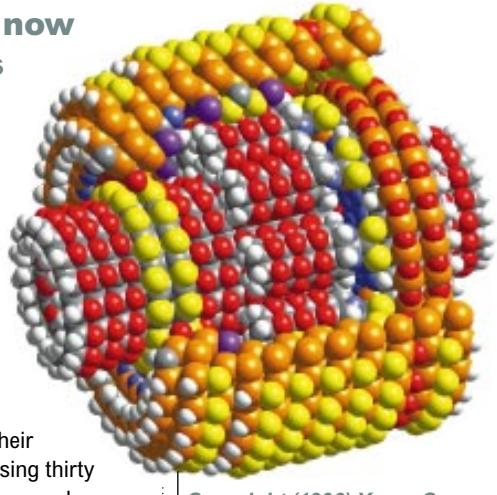
Recognising that everything is made from atoms, nanotechnologists suggest that we work directly with them. Chemists, of course, have been doing precisely this for a very long time. Given the circumstances in which they work — typically with randomly colliding molecules in solution — their success at synthesising compounds is extraordinary.

With nanotechnology, the idea is to work bottom-up, physically assembling atoms one by one into molecules, and then assembling the molecules together. In theory, as long as no physical law is violated, it should be possible to create any amount of any substance.

The idea has its roots in an after-dinner speech given at the California Institute of Technology in 1959 by Richard Feynman. He said: "The principles of physics, as far as I can see, do not speak against the possibility of manoeuvering things atom by atom."

He was right. Today, it is possible to manipulate individual atoms as if they were marbles. In 1990 two researchers spelt out the name of their employer, IBM, using thirty five atoms of xenon, each one dragged into position on a crystal of nickel using the sharp tip of a Scanning Tunnelling Microscope. The conditions required were harsh — an ultra-high vacuum at almost absolute zero — but within the year other researchers were manually positioning individual atoms at room temperature. But building entire molecular structures this way is impractical. The difference in scale between the constructor and the components is too great. What is needed is a tool that is itself atom-sized. Enter K Eric Drexler and his concept of the "universal assembler".

Drexler is perhaps the best-known exponent of nanotechnology and some of his ideas are compelling. His proposed "assembler" is essentially a submicroscopic computer-controlled robot arm, able to manipulate and bring together atoms and reactive molecules such that chemical bonds occur at specific sites. To synthesise material on a macroscopic scale, billions of these assemblers will work in parallel. But you only ever need to build one assembler, since each assembler can replicate itself.



One of Drexler's proposed assemblers is one ten-millionth of a metre in length and made of four million atoms. Its structure is bewilderingly complex, a Heath Robinson affair of grippers, rotary joints, worm drives, bearings, shafts and gears, each created from a few atomic components.

Although Drexler's assembler sounds far-fetched, funding agencies are already paying researchers to work on computer models of engineering structures such as bearings, hinges and pumps, all made from a few atoms. Workers at Xerox PARC have demonstrated the feasibility of molecular bearings which require no lubrication, constructed from several hundred carbon atoms.

Also under study is a "hydrogen abstraction tool" which can be precisely positioned over an atomic surface and can selectively remove hydrogen atoms from it. Such a tool could greatly increase the yield of diamond synthesis using the existing proven technique of Chemical Vapour Deposition.

A recent article in Scientific American took a rather negative view of nanotechnology, asking: What about thermal noise? Quantum uncertainty? Loose molecules? Out-of control assemblers reducing the world to a grey goo? Within weeks, an extensive and convincing rebuttal by a leading nanotechnologist was published on the Web.

It is not hard to understand the scepticism with which many people view the ideas and promises of nanotechnology. Consider tiny molecular machines with on-board computers which enter our bodies and perform surgery from the inside; mouthwashes that contain tiny robots to look after our teeth; furniture that can change colour and shape; entirely new classes of substance, comprising billions of tiny molecular machines physically and computationally linked together to form a kind of super-crytalline structure. This might form a wearable fabric which responds to temperature; a flowable "smart" paint that spreads itself evenly on your wall; ultra-thin layers of molecules that function as loudspeakers or huge video screens. Next to these, my voice-activated sellotape looks rather quaint.

When speculating about future technologies, an open mind is essential. But not too open. To date, Drexler and his nanotechnologists are theorists. They model their atomic machines using CAD packages, and look to the chemist and physicist to make the ideas actually work. Perhaps it will never happen. But perhaps something like it will. Until then, nano news is good news.

Toby Howard

PCW Contacts

Toby Howard is a Lecturer in Computer Graphics at the University of Manchester, and co-editor of *The Skeptic* magazine.
A collection of links to information about nanotechnology may be found at **http://www.cs.man.ac.uk/aig/nano/**

Retro

Luciano's **laptop**

The Toshiba 5200C100 was the first colour portable on sale and it was *BIG*. Inside there was a chip sandwich and the screen lacked salt and vinegar.


Toshiba 5200 Colour

WHAT KIND OF COMPUTER would you expect for £7,000? A portable? If so, it would have to be jolly small, blindingly fast and have a stunningly good colour screen.

Back in 1990 *PCW* saw its first colour portable, which, unless you had a lap the size of Pavarotti's, could hardly be described as a laptop.

We'd seen a technology demonstration of colour before (from NEC) but the Toshiba 5200C100 was the first model designed for sale. Back then, Toshiba dominated the portable market with a 65 percent share — the move to stay ahead in technology was an important one.

At 37cm wide by 39cm deep it was a big machine but allowed a standard complement of interfaces: two 9-pin serial ports, a 15-pin VGA socket and a connector which doubled up as a printer and external disk drive port. Power was supplied through a traditional kettle lead next to a well-recessed on/off rocker switch. It had two slots (one full and one half length) and a briefcase-style combination lock to keep your business secrets intact.

The T5200C100 was reviewed in the days when *PCW* tried to take portables apart, but even back in screwdriver-friendly days, getting into the T5200 was hard work and after undoing 14 screws the case failed to budge. A further six and it started to give way but not enough to really get to the PCB. User upgrades (RAM and a co-processor) were fitted by removing four screws along the front edge which then allowed you to prise off the keyboard. A second board was mounted on the removable panel and inverted, making a chip sandwich.

The CPU was a 20MHz 80386 which was said, by *PCW*'s reviewer, to "tick along pretty speedily". He added: "It is always impressive to work on a portable machine which is this powerful" — so remember that when we next claim the 200MHz Pentium is something special!

The most important aspect of the machine was its screen. A 16-colour VGA colour, it used a double-supertwist nematic display with filters for red, green and blue, and a pigment-dispersed microcolour filter allowing you to see 16 colours as opposed to eight. Toshiba claimed nearly twice the contrast and brightness of previous passive colour displays.

Improving the contrast not only made the screen easier to read but also cut down the size of the backlight needed, thus reducing the computer's weight and power consumption.

Toshiba claimed a 20 percent transparency for the display: in other words, only a fifth of the light which went in, came out. It was still appalling but that didn't stop the marketing departments reaching for the book of superlatives — especially the Americans. "The day of the portable desktop computer has finally dawned in earnest," gushed Tom Martin, vice president of marketing for Toshiba's computer systems division. His boss, the VP and general manager of Toshiba US, Bill Johnson, was no less forthcoming, claiming: "Colour is the last barrier between portables and satisfying the needs of 90 percent of computer users." In truth, this claim was for a machine with a poor VGA, with 16 colours from a palette of 16. A utility called VCHAD could be used to re-map the colours but beyond that the screen suffered from other LCD traits, with a not-quite clean blackboard smudginess persistent on the screen with each row of pixels fading like a special effect from Dr Who.

The ghosting wasn't unattractive but it was very brave of Toshiba to supply the review machine with a copy of Flight Simulator 4 on the hard disk: a gentle roll in the Cessna showed as a trail of pixels as the horizon rotated. Normal flight gave a realistic haze to the horizon and tumbling the glider from 11,000 feet caused the wings to turn into a blur of pixels.

A more normal use, and one cited by Toshiba, was to run Windows 3.0. Here, the colour mapping problems manifested themselves as green bars where Windows expected grey and the persistence led to the pointer vanishing when you moved it quickly. It was a problem with which we were to become familiar.

Sometimes, new technology is wonderful and exciting, but all too often, as with the T5200C100, it's a bit disappointing (mobile comms is a bit like this today). The first colour machine certainly wasn't worth £7,000, but it was worth *something* — it was stolen shortly after the review.

Simon Rockman

BOOKS

A guide to happy, healthy and productive computing; a dark view of the Internet; one side of the story of Kevin Mitnick's sixth arrest for hacking; and a valuable guide to finding what, where on the Web.

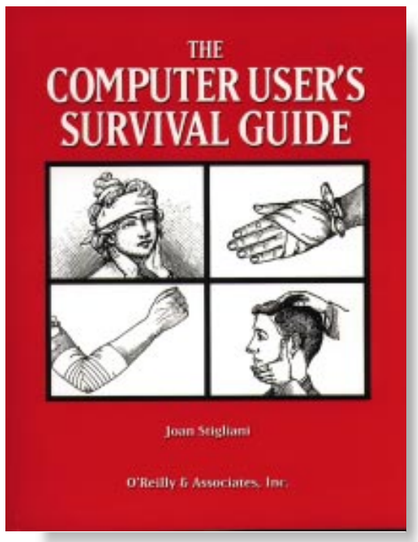
The Computer User's Survival Guide

By the sound of this title you'd think that the human race is engaged in mortal combat with the computer. Funnily enough, this isn't too far from the truth, albeit without the hand-to-hand combat. The author, Joan Stigliani, has managed to write a pretty convincing case for protecting yourself against the ills that can afflict you following intensive computer use.

Stigliani covers the whole gamut of injury created by computer use, such as eye strain, stress, possible miscarriage, muscle ache, the ever-popular repetitive strain injury (RSI) and more. For the huge numbers of computer users out there, particularly from an employee/employer point of view, this information could prove to be invaluable. Stigliani strives to get the message across that computer users need to take control of their work environment and rid themselves of poor habits that can lead to poor health.

The book extensively covers ailments like muscle ache or RSI-related nerve injuries and provides solutions to remedy the situation. Simple self-massage techniques and stretches help with muscle ache while proper posture and keyboard/mouse design assist in reducing RSI.

More importantly, the author discusses the nascent problem of children using computers and the potential time bomb of illness that could manifest itself without preventive action. It's all common sense, but when you read the book you can't help but be struck by the extent of poor computer use that permeates most work environments. Stigliani is clearly aware of this and the whole thrust of her book boils down to one simple message: proper tools and proper use make for a positive work environment.



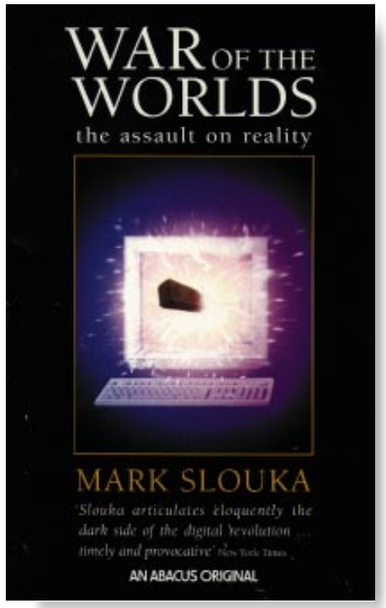
Stigliani covers much more than this review could possibly do justice to but suffice it to say that, particularly for employers, £18.50 could be a small price to pay for keeping workers healthy, happy and productive.

Dylan Armbrust

The Computer User's Survival Guide
Author Joan Stigliani
Publisher O'Reilly & Associates
ISBN 1-56592-030-9
Price £18.50
Rating

War of the Worlds — the assault on reality

For Mark Slouka, the Internet is little more than an Inferno for society's most depraved. It's not a new thought, but *War of the Worlds* really hammers home a darker side of the digital revolution. Slouka describes a real-life incident in which a character playing in a MUD (Multiple User Dungeon) calling himself Mr Bungle "virtually" raped and assaulted other characters. Using cyberspace as a firewall against emotional or physical engagement, this person anonymously wreaked emotional havoc on several complete strangers.



Many would argue that if the Internet allows these individuals an artificial channel for violence, this can only be a good thing. They are missing the point.

War of the Worlds paints a picture of a world in which humans are increasingly living out their lives in "substitute realities". Cyberspace has developed a new brand of transcendentalism that denies the physical with as much zeal as Christianity. And the consequences for our mental wellbeing can be disastrous. For the bulk of society, this won't mean psychosis as much as a weakening of the identity and an ever-growing conformism. The idea of a digital world village, for Slouka, is one step from an Orwellian police state of the mind — "…it combines the worst of television, its addictiveness, its passivity…" with the kind of mob culture that allowed the Third Reich to flourish. "In the digital future...the human hive will not mourn its drones any more than a beehive thinks to count its dead."

Far from making the world a fairer place, cyberspace is creating a new class structure: the "digerati" who are empowered by technology will have complete control over the "drones"; the ordinary citizens who swim amid increasing reams of information without any significance.

At times Slouka's pessimism is just so much technophobia. It is important to remember that most life-altering technologies have been greeted with a similar response, including television, electricity, and possibly even the wheel. Cyberspace has no monopoly on fanatics, loners and sadists. There simply isn't the bandwidth available to perpetrate the mass-brainwashing he suggests.

If you want a serious overview of the Internet, forget it. But as a brilliant conspiracy theory and a sinister cautionary tale, *War of the Worlds* is an entertaining trip.

Jessica Hodgson

War of the Worlds — the assault on reality
Author Mark Slouka
Publisher Abacus
Price £9.99
ISBN 0-349-10785-8
Rating

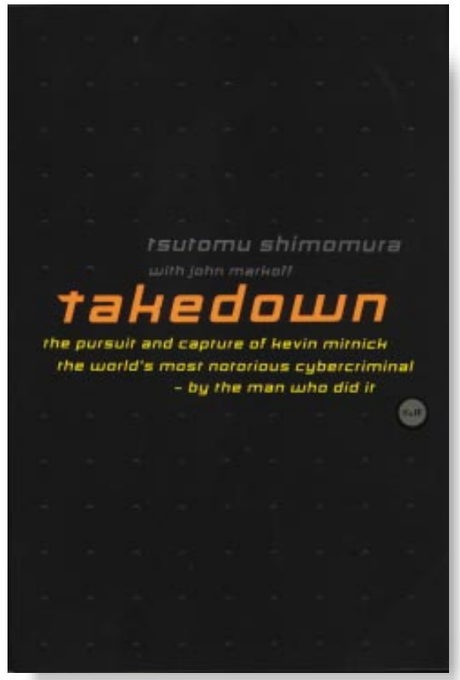
Takedown

Tsutomu Shimomura is an overachieving Japanese-American. A child prodigy, he rose to become (at the age of 19) the youngest post-doctoral researcher at the Los Alamos National Laboratory since Richard Feynman held a similar post back in 1942.

This came about partly through Shimomura's voracious appetite for advanced physics, a massive intellect and not a little luck.

Too clever for most of his contemporaries, he found himself in high school and university way before he should have been. By hanging around with cult computer clubs he managed to meet and make friends with the right people.

But he also became fascinated with computer security, especially on his beloved Unix systems — the backbone of the Internet. Like many in Silicon Valley his skills have earned him a wealthy lifestyle and a reputation as America's leading expert on computer security.



Even he was vulnerable, however, and when he discovered that his own systems had been broken into he decided that he was going to take down the perpetrator. Taunting messages began to reveal the hacker as Kevin Mitnick who had wrought havoc on phone and computer systems throughout the US. Despite having being jailed five times, Mitnick was back.

Originally, it seemed that Mitnick was after the code that Shimomura and a friend had written, by reverse engineering the ROM chip inside an OKI cellular phone, to build and sell "field diagnostic devices" — in other words, scanners enabling the FBI and others to eavesdrop on cellphone conversations.

This is a revealing little episode into the morality of hacking. Shimomura seems to have no problem with this at all, but there are two issues. Firstly, what right did they have reverse engineering the ROM chip? He admits they received no sanction from OKI. And secondly, does the FBI have any more right than Mitnick to scan private conversations?

But Shimomura doesn't let morality stand in the way of a good story and we are soon plunged into the logistics of tracking Mitnick and his cohorts. If you like reading about the inner workings of Unix log files, shells, cellular technology and email systems you'll get off on this. What you won't get off on is Shimomura's incorrigible ego nor his plodding style. Despite his genius for computing, he's no writer.

What a pity Shimomura couldn't write a hack to inject a little modesty into this book — and himself. There is no doubting the man's intelligence but almost every page is littered with examples of just how clever he is. You soon tire of his programming feats, what a great skier he is (that's his other hobby), how just every single one of his colleagues is not as clever or as fast as he is.

A whole chapter, ironically entitled "The Real World", is given over to Shimomura's (admittedly) remarkable life story. Thanks to the guidance of a biochemist father and pharmacologist mother he learned to experiment and explore science at an early age before finally achieving that exalted research position at the age of 19.

But we learn very little about Shimomura other than his love of computers and virtually nothing of his prey; Mitnick. Shimomura is in love with a woman called Julia who shares his passion for skiing and hanging out in health food restaurants. He does very little else. A detective story needs to round out its key players: we get none of this.

What then did John Markoff, the author of CyberPunk, contribute to this book? He's billed as co-author but it's a Shimomura one-way street. If Markoff had written this book alone we might have got to know Shimomura and Mitnick better, and understood better why hacking actually strikes terror into the heart of corporate America.

Takedown gets almost exciting at the end when Shimomura, the FBI and others finally close in on Mitnick armed with cellphones (OKIs?) and scanners, all hidden in unmarked vans. Mitnick responds to his unwelcome visitors by vomiting on his carpet. This would be his sixth arrest.

But why did Mitnick do it? Why did he attack Shimomura in the first place? He may have wanted the secrets to the OKI chip but in the end you are left

wondering: did he bite off more than he could chew, or was it an act of self-destruction? It is said serial killers want to be caught. Are serial hackers the same?

To those who argue that Mitnick never harmed anyone, Shimomura says that Mitnick's real crime was against the "original spirit of the hacker ethic" and that because of him the Internet is no longer open as networks rush to build firewalls to keep Mitnick and others like him out. But what of the FBI and their tricks; are they any different?

Poor Mitnick, he barely gets a look-in on this Paean to Shimomura's ego. There is more to this story and it needs another book to tell it.

PJ Fisher

Takedown
Author Tsutomu Shimomura & John Markoff
Publisher Secker & Warburg
Price £9.99
ISBN 0-436-20287-5
Rating ✒ ✒ ✒ ✒ ✒

Finding It On The Internet

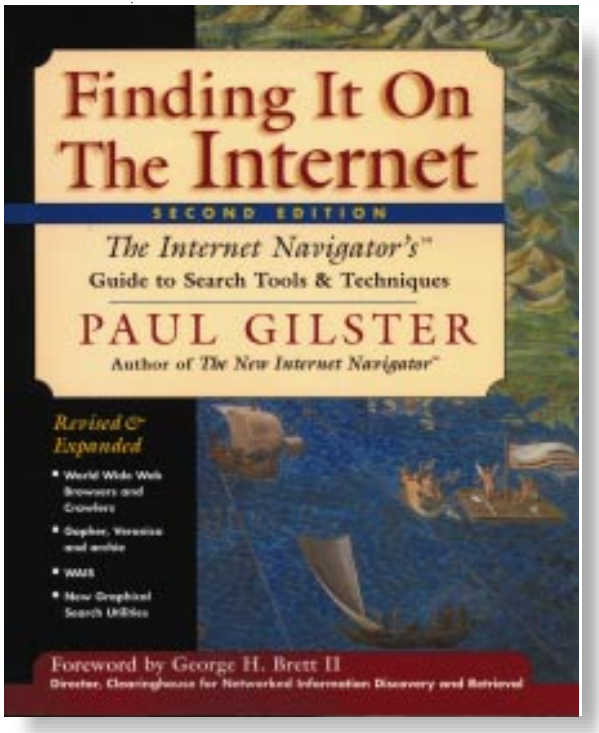
Finding information on the Internet is easy, right? Just type a couple of words into Yahoo or Alta Vista and it comes up with hundreds of irrelevant listings, for which you need another search engine to find what you want.

There are other ways of doing searches — you just need to know how and learn a little more. Paul Gilster's book will show you how. Coming from the Internet "old school" he still believes in such tools as Archie, veronica, WAIS and gopher, explaining how new, graphical, versions of these clients can work for you. With a little patience you can get these tools to work far more effectively than many of the well-known WWW search sites. For those who still prefer the Web, Gilster has a chapter on how to get the best from Web-based search engines.

It's not cheap, but reading this book from cover to cover could save you far more in online charges. Recommended.

PJ Fisher

Finding It On The Internet
Author Paul Gilster
Publisher John Wiley
Price £16.99
ISBN 0-471-12695-0
Rating ✒ ✒ ✒ ✒ ✒



Top Ten Books: July 1996

1	Java in a Nutshell: Desktop Quick Reference	O'Reilly	£10.95
2	Visual Basic Programmer's Guide to Win32 API (Book/CD-ROM)	Ziff-Davis	£46.99
3	Teach Yourself Java in 21 Days (Book/CD-ROM)	Sams.net	£37.50
4	Programming Windows 95 (Book/CD-ROM)	Microsoft Press	£46.99
5	Running Linux	O'Reilly	£18.50
6	Microsoft Windows 95 Resource Kit (Book/CD-ROM)	Microsoft	£46.99
7	Hooked on Java (Book/CD-ROM)	Addison-Wesley	£24.95
8	More Effective C++	Addison-Wesley	£22.95
9	Essential Distributed Objects Survival Guide	Wiley	£22.50
10	Introducing Microsoft Exchange (Book/CD-ROM)	Microsoft Press	£27.99

List supplied by The PC Bookshop, 11 & 12 Sicilian Avenue, London WC1A 2HQ
Tel: 0171 831 0022. Fax: 0171 831 0443

Go cartoony loony and peek at Pocahontas, Toy Story and others. An artrageously good art-based CD has family appeal and David Bellamy fwonts a CD-WOM about endangered wildlife. With Paul Begg.

Just recently I took my daughter, Siobán, to Disneyland Paris for a long weekend. We did the works, even Space Mountain, about which I can tell you nothing because I had my eyes closed in terror from beginning to end.

One of the attractions there is the Main Street Parade, a special part of which was this year given over to Pocahontas, so I came away rather looking forward to reviewing the CD-ROM.

Pocahontas Animated Storybook

If you have young children who enjoyed the movie and maybe even have the video, they'll love this easy-to-use CD.

You can either read the story or have it read to you and a click on red highlighted words gives you a definition (often followed by a new animation). This all makes Pocahontas not just a storybook, but also a learning vehicle, expanding on the movie and video.

As well as the story, you get to play games with Meeko and Flit, explore Powhattan's village and the English settlement. And comprehensive help is available at a mouse-click.

Pocahontas — it's difficult to beat Disney

Toy Story Screen Scenes Screensaver

The latest Disney movie, Toy Story, is a 3D computer-animated romp which is some of the best fun you will have had in a cinema with your children for a long time. The CD-ROM isn't exceptional, it's merely scenes from the movie which you can use as wallpaper and as a screensaver.

The pictures are great but I find screensavers and wallpaper a bit boring, especially when there's neither animation, nor sound effects, nor music. Nevertheless, the savers and wallpaper were fun and above all different — even novel enough to be used in the office!

What your children might enjoy, though, is the puzzle game which comes with the package — you know, those puzzle squares where you have to move one piece a square at a time to complete the picture. This is a computer version of that game. You can shuffle the pieces, set a difficulty level from 12 to 192 pieces, and check your progress. The game can be absorbing: using up hours of futile concentration.

Toy Story wallpaper and screensavers plus a game — it actually grows on you!

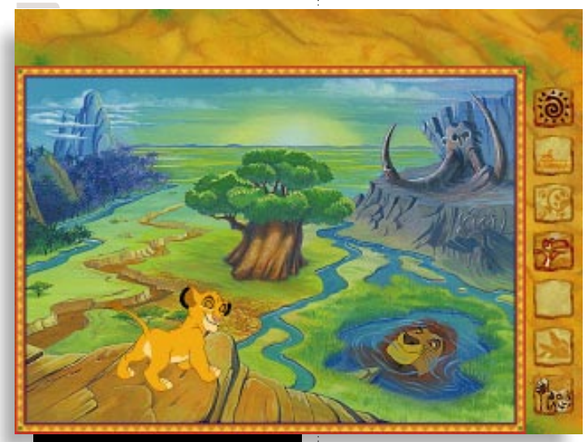
CUTTING EDGE

The Lion King Activity Centre

This is the final package to come our way from Disney this month. I looked at the Aladdin Activity Centre last month and the Lion King isn't hugely different except for the characters and the settings.

From Pride Rock you can survey the Pride Lands and decide whether to visit the Jungle, Rafiki's Tree, the Shadowlands or the Magic Pool.

At each location there are different activities. For example, in the Jungle you can play Pumbaa's Hidden Animal Friends, Timon and Pumbaa's Spelling Game or Timon's Bug Matching Game. To each game you can add difficulty levels, so all the family can play. All these games are designed to stimulate and develop logic, word and organisational skills and simple mathematical concepts.



The Lion King — you can choose where to play

At the Magic Pool you can watch six lengthy extracts from the movie, complete with music and the voices of the cast of the original movie.

Young children like familiar things. No matter how good a piece of software might be, it can often be exceptionally difficult to get your child to change from something tried and trusted. The great thing about these Disney packages is that they are based on movies children know and love, so you can be almost certain that your investment will be rewarded by the software actually being used.

Thumbelina

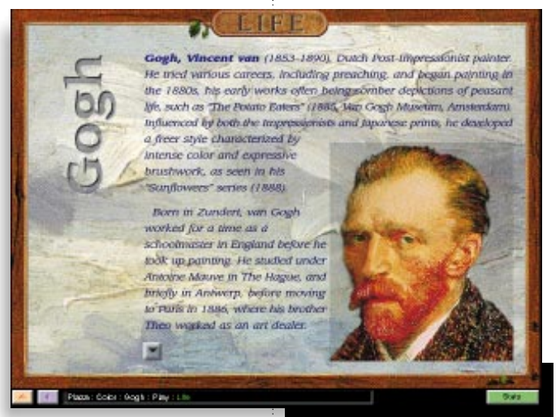
While we are in the area of cartoons, let me make quick mention of Thumbelina, from VCI Software. If anybody rivals (and perhaps even surpasses) Disney, it is Don Bluth who has made some cracking animated features. His Thumbelina, with some lacklustre songs by Barry Manilow, seemed to passed almost without notice (well, I didn't notice it) but it is a nice story and charmingly animated.

The interactive CD-ROM will read you the story or let you read it yourself and allows you to paint, match animals with their names and sing along to the songs.

The CD was first released a couple of years ago, by Time-Warner Interactive, and VCI has anglicised it a little and now offers it at a low price — good value for money for three- to eight-year-olds.

ArtRageous

Far and away the most impressive package we've seen this month is ArtRageous. It's so good that I began to doubt whether it was a kid's product at all. There is no question, though, that this is family software: enough justification for it to be reviewed here. And if you have older children with an interest in art, they should have this disk.



ArtRageous fun, but the serious side is a database of artists, artistic terms, schools and so on. Superb software

ArtRageous isn't really similar to anything else, which in a way is what makes it so good. It is one of those rare animals: a program uniquely designed for the computer and doing what couldn't be done in any other medium.

The world of ArtRageous is arranged around a central plaza. You move right or left to what are called "neighbourhoods" in ArtRageous-land. These neighbourhoods are Colour, Composition, Light, Perspective, Database and Timeline.

With Colour you can mix it, change it, and discover ways in which it can have an impact on your favourite works of art.

Perspective unsurprisingly looks at perspective in paintings, how it has been used down the centuries and how you can create angles and illusions.

Composition looks at the details in a painting. You can see how moving them changes the feel of the painting.

Light looks at the ways in which light and dark affects the drama of a piece.

The Timeline shows you what happened in the world of art and when, and also sets it against the background of what was going on in the world. There is an outstanding database of artists, schools of art and techniques, too.

Overall, ArtRageous is a cracking product: well worth trying to get a look at and definitely a must-have for anyone interested in any aspect of painting. Superb!

David Bellamy's Endangered Wildlife

After ArtRageous, David Bellamy's Endangered Wildlife seems a bit basic.

"Many of the world's most magnificent animals are heading for extinction," writes Sir David in the manual. "If I didn't believe they can all be saved then I wouldn't be wasting your time."

As far as I can see, this short introduction is David Bellamy's sole contribution to this CD-ROM — apart from allowing his photograph to grace the box. I don't mind this, but I think it is a bit of a scam. You could buy this CD-ROM in the mistaken belief that it was written by Bellamy, or at least narrated by him — which could be a big plus in the purchasing decision if your kids like David Bellamy — but he has merely endorsed the product.

The Interlink — play games, uncover the hidden picture and learn about endangered animals

You explore the world of endangered wildlife either through Games or a Tour. The games include jigsaws, word-searches, crosswords, noughts and crosses, and quizzes.

The Tours take you to meet all 44 classes of endangered species, across six continents, and is designed to help children understand about wildlife and conservation issues.

The program includes 200 photographs and more than 30 colour full motion videos of creatures in their natural habitats. All the facts in the program can be printed for school reports, extra-curricular activities or bed-time reading.

The game is fairly simple though absorbing while you are playing it. Essentially, you have a board (similar to a chessboard) on the screen, which is called an "Interlink". Behind each square is part of a picture. You have to remove the squares to reveal the picture and you do this by solving puzzles, playing games, typing in answers to questions, and so on. Along the way, you learn about different endangered species.

Frankly, I'm not sure what to make of this CD-ROM. It is aimed at children aged eight upwards yet I wonder if children of that age will really find enough here to keep them entertained.

The trouble is, if you have a child who is interested in wildlife, especially one sufficiently interested to find playing these games enjoyable, they will probably have got all the information on this CD in a book and won't need the incentive of puzzle-solving games to acquire knowledge. On the other hand, if your child isn't interested in wildlife, I doubt that this CD-ROM will inspire them to learn. Perhaps the injection of some infectious enthusiasm from David Bellamy into the video footage and narration would have helped.

The Gingerbread Man

Do the following words mean anything to you? "Are you sitting comfortably? Then I'll begin." So opened the BBC's Listen With Mother, a radio series I fondly recall and memories of which came flooding back when I launched The Gingerbread Man.

Not only did it begin with those famous words but also the story is narrated by Daphne Oxenford, the storyteller on Listen With Mother.

The Gingerbread Man is the first title in the new Read & Play series from Europress, which will include Goldilocks and the Three Bears and The Three Little Pigs.

It is the usual animated storybook — read the story yourself or hear it narrated, watch some animation, start other animation by clicking the on-screen hotspots. Europress claims The Gingerbread Man "contains hundreds more audio and graphic effects than any other children's program for the PC." It is nicely drawn and animated and should provide a lot of pleasure.

Adults will find a section about the

The Gingerbread Man has it away on his toes

origins of ginger and the making of gingerbread (which used to be made from stale bread!), and there is a recipe for gingerbread on the CD as well as a free gingerbread cutter in the box (or so I have been told, as there wasn't one in *my* box).

The nice thing about the Europress titles is that the CD can be played on an ordinary audio CD player, giving you the best of both worlds: an animated activity which children can play alone or with you and a bedtime story or tale you can play on your car CD.

Super Ten Kids Entertainment Pack

Let's end this month's sort-through of children's software with one of the best bargains to have come along in a long while, namely Corel's Super Ten Kids Entertainment Pack.

This contains ten CD-ROMs (most of which have been previously reviewed in this column). There's the full set of Alan Rogers electronic colouring books: Blue Tortoise, Green Bear, Red Rhino, and Yellow Hippo, the two Nikolai stories (Nikolai's Trains and NN'nN Toy Makers which is an adventure with Nikolai and his toy cat Neow-Neow). Plus Adventures with Edison, Wild Cards, Wild Board Games and The Interactive Alphabet.

Pandora's Box

To completely round things off, new from Corel is Pandora's Box.

It is bright and colourful but not an exceptional cartoon — not after Disney and Don Bluth anyway — but it isn't expensive and tells a traditional story drawn from Greek mythology.

It's a nice way to reinforce the National Curriculum requirements for the history of Greek civilisation. It's not great, but worth taking a look at.

Pandora releases the Miseries

PCW Details

Pocahontas Animated Storybook [1]
Toy Story Screen Scenes Screen Saver [2]
The Lion King Activity Centre [3]
Prices £44.99 [1]; £24.99 [2]; £44.99 [3] (incl VAT)
Contact Buena Vista
Tel 0171 605 2400
Fax 0171 605 2984
Ratings ★★★★☆ [1]
★★★☆☆ [2]
★★★★☆ [3]

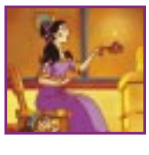
Thumbelina
Price £14.99 (incl VAT)
Contact VCI Software
Tel 01923 255558
Fax 01923 817968
Rating ★★★★☆

ArtRageous
Price £24.95 (incl VAT)
Contact Softkey International
Tel 0181 789 2000
Fax 0181 789 5626
Rating ★★★★★

David Bellamy's Endangered Wildlife
Price £19.95 (incl VAT)
Contact GSP
Tel 01480 496666
Fax 01480 496189
Rating ★★☆☆☆

The Gingerbread Man
Price £19.99 (Incl VAT)
Contact Europress
Tel 01625 859333
Fax 01625 879962
Rating ★★★☆☆

Super Ten Kid's Entertainment Pack
Price £39.95 (incl VAT)
Contact Channel Marketmakers
Tel 01703 812755
Fax 01703 813830
Rating ★★★★☆



Pandora's Box
Price £19.99 (incl VAT)
Contact Channel Marketmakers
Tel 01703 812755
Fax 01703 813830
Rating ★★★☆☆

CD-ROMs

Fun, culture and the stuff of legends. It's all here: from a virtual dog zone, to various Vermeers, to exploring myths with a mad monk.

The Art of Singing
Notting Hill, the maker of this CD, was set up last year by Andreas Whittam-Smith, former editor of *The Independent*. The company's latest product takes strongly after the current vogue for virtual reality environment CDs.

All the information can be found by wandering around in the Academy of Song: a sort of mythical opera house, complete with concert hall, practice rooms, dressing rooms and seminar rooms, plus a few added peculiarities such as a doctor's surgery.

The VR approach is great fun. As you walk around you come across all sorts of things that you might not necessarily look for, such as the creative room where there are extracts from all kinds of sources on the subject of singing.

However. there are a few down sides. It takes a while to find out where you are going as you flounder about, shooting up staircases and down corridors, peering at the various doors in an attempt to find what you are looking for.

You cannot go directly to any part of the disc but have to walk around the building to get there. So, you might want to hit Alt F4 to get out quickly rather than spend the two minutes or so it takes to exit via the way out.

Each room has its own theme. You can go into the concert hall to listen to some of the greats, including Luciano Pavarotti and Maria Callas singing various arias, or go into singers' dressing rooms to hear them speak on various subjects. There is a seminar with Jonathan Miller, answering questions from such late luminaries as Mozart and Wagner.

The practice room is particularly good, as students representing all the vocal types rehearse a piece, taking hints from their teacher.

There are two technical niggles on this disk. The first is that you can only run it in 256 colours — I prefer to run in at least 16-bit colour. Secondly, when run on an external quad-speed CD-ROM drive attached to my Mac it ran very badly — the sound was broken up and the graphics were very jerky. I had no such problems with a six-speed drive on the PC, so it's not certain whether the problems were inherent in the Mac version of the dual format disk, or whether it was the speed of the drive.

But these troubles aside, The Art of Singing is highly entertaining.

Adele Dyer

Above *Listen to a performance or visit the singers in their dressing rooms*
Left *You must find your own way around the Academy of Song*
Right *"Do-re-mi…" — drop in on a practice room*

The Art of Singing
Contact Notting Hill
0171 229 0531
Price £39.95 (incl VAT)
Rating ●●●○○

Guinness Multimedia Disc of Records
Any child of the seventies could hardly fail to be touched by the cult of bizarre world records. Record Breakers, with Roy Castle and Norris McWhirter, was compulsive weekly viewing as we breathlessly waited to see how many tap dancers they could get all tapping together or how many dominoes would topple over with just one push.

Perhaps it is only when you reach adulthood that you realise just how strange many of these records are. Indeed, you can appreciate the incredible lengths to which people will go to break these bizarre records: to achieve their life's goal of, say, eating more pickled gherkins than anybody else. The appeal of the disc comes from exactly this type of weird and wonderful trivia.

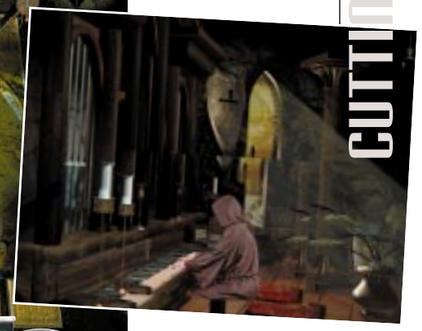
The CD is based on the *Guinness Book of Records* — the best-selling copyright book in the world (after non-copyright books such as the Bible and the Koran) — and sticks closely to the same formula as the book but with added video to jazz it up.

The two main search routes are via topics or superlatives, so you could look up the oldest Oscar winner (Jessica Tandy, for Driving Miss Daisy) via either the film section, under "topics", or via "oldest" in the superlatives.

The variety of topics covered is astonishing, ranging from satellite pictures of Jupiter to the world's longest poem. If you just want to delve, you can look through the random access section which presents various facts in caption form, together with a photograph. You cannot access the main article from the random search: you must go to the topics search and look afresh for anything that has captured your imagination.

While the CD is primarily for trivia fans, it has some appeal as a form of encyclopedia. The sections on natural wonders and sports events, for example, are just as relevant to both but the *Guinness Book of Records* version is at least a little less precious.

Do you know, the mad monk can guide you around? No, but you hum it, he'll play it



The emphasis, despite the dull interface, is on fun and for the price it does give good value entertainment.

Adele Dyer

Guinness Multimedia Disc of Records
Contact Grolier Interactive
01865 245770
Price £24.99 (incl VAT)
Rating ●●●○○

Myths and Legends Vol 2: Lost Cities and Mythical Lands
Myths and Legends is a series from EMME, best known for its fine art CDs. The first volume was on monsters and mythical creatures. This is slightly less ghoulish and concentrates on mythical places.

When you first launch the CD you appear in a room of a castle, furnished in gothic style with an organ, stained glass windows and a huge globe. Click on the organ and a ghostly monk appears, playing a dramatic tune and giving you a hyperbolic description of the background to the CD.

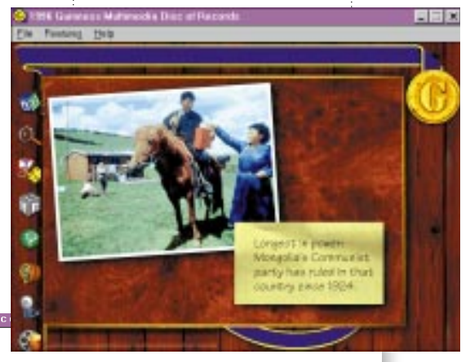
To get into the worlds you will have to find their co-ordinates and tap out the numbers on rune stones that magically appear out of the sea. You are given a cheat inside the case, which is just as well: you might otherwise play around for ages trying to find the right combinations to get beyond the opening screen.

The "lands" covered are: Atlantis, the Tower of Babel, Easter Island, Eldorado, the Bermuda Triangle, the labyrinth of Daedalus, Stonehenge, Herod's temple, the Garden of Eden, and the Fountain of Youth. Not all strictly cities or lands, but perhaps that's just being pedantic.

In each land there is a video introduction from either the mad monk or a sort of Greek oracle, hammed up by Amanda McLaine (Shirley's daughter). These are the funniest aspects of the CD. The overacting is extreme and the dialogue is hilariously over the top.

The main information screen is based on text and pictures alone but the content is nevertheless comprehensive and very well written. It concentrates mainly on descriptions of the places, origins of the myth and any truth behind the myth. The information goes way beyond the usual trite facts and digs deeper. It is certainly not a CD aimed purely at children and should appeal to anyone.

The only slightly annoying



Above *"Here, Genghis, don't forget your packed lunch this time"*
Left *Hmm… I wonder: who's eaten the most gherkins at one sitting?*

aspect is the music. It is quite pleasant at first but it continually loops until you are forced to pull the plug on your speakers.

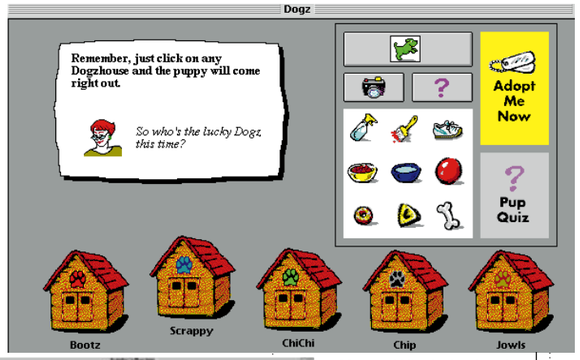
All in all this is a highly entertaining CD, especially with all the gothic horrors, and includes enough information to make it a real treat.

Adele Dyer

Myths and Legends Vol 2: Lost Cities and M ythical Lands
Contact Koch Media
01420 541880
Price £39.99 (incl VAT)
Rating ●●●●❍

Dogz
If you've always fancied owning a dog but can't quite cope with a pooper-scooper, the latest release from Mindscape could be for you. Dogz, "your computer pet", lets you adopt a virtual pooch complete with a never-ending supply of food and water.

Dogz gives you five breeds of dog to choose from, each with a different look and its own characteristics. Bootz is a large, strong Setter, Scrappy is a playful Terrier and Chi Chi is a somewhat timid-looking Chihuahua. Me, I went for a mongrel called Chip who's best described as cute but stupid. If you can't decide which dog is best for you, a short Pup Quiz can sort you out.



Above *Who's in the dogz house?*
Left *Rover-round and pick your pup — he'll bounce with health*

Once you've adopted your puppy the idea is to train him to respond to your commands. To this end the program provides you with all the essential tools, including balls for him to fetch, treats for when he does well and a small water spray for those disobedient moments.

You can pet your pup by holding down the mouse button over him, and you can teach him to perform a wide variety of tricks. In time your puppy grows, so train him early for the best results.

For those moments when you're not at your keyboard Dogz can act as a screensaver. When the "Guard Dogz" option kicks in, your dog goes on patrol stomping around the screen and letting off the occasional howl. You can set a password, too, so he will bark when someone attempts illegal access.

Apart from that there's not a lot else to Dogz. It really is just good clean fun. The graphics are wonderfully lifelike and I can see some people becoming quite attached to their new-found friend. I've actually managed to teach mine to do handstands and juggle a ball on his nose for bones!

To run Dogz you need either a 486DX PC with 4Mb of RAM, Windows 3.1 or higher, VGA, a mouse and 6Mb of hard disk space, or a 68040 or PowerPC Mac with 4Mb and 8Mb of disk space.

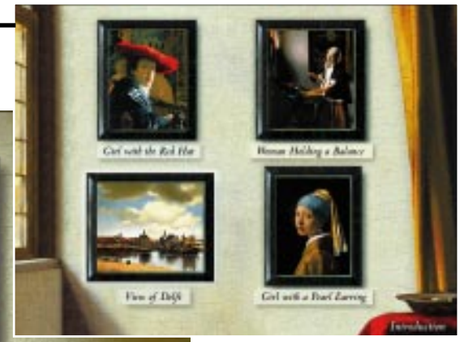
Chris Cain

Dogz
Contact Mindscape
01444 246333
Price £14.99 (incl VAT)
Rating ●●●●❍

Vermeer — an exploration of the artist and his techniques
As with many of the art CDs currently available, this one is tied to an exhibition, or in this case exhibitions, in Washington and the Hague. But you do not need to have seen the exhibitions to enjoy the disk.

The CD covers four works in detail: Girl with the Red Hat, Woman Holding a Balance, View of Delft, and Girl with a Pearl Earring. Various subjects are covered for each of the paintings, including its history, an analysis and the techniques used. The subjects are broken down into numerous sub-categories and most are presented as short video clips. In fact, there are over 100 documentary sequences mostly consisting of stills photographs of various works, perhaps with some panning between views and a narrative played over the top. There are relatively few text passages and these are fairly skimpy compared with the narrated texts.

Painting by numbers, it's not: "Woman Holding a Balance" — is she weighing up her modelling fee?



The amount of information crammed onto the CD is impressive and it is equally heartening to see works covered in this much detail. Many art CDs go for quantity of paintings rather than detail and this disc makes a refreshing change. Nevertheless, it does also include a good number of works. There are 17 of Vermeer's other paintings and 75 related works hidden among the sequences, but as there is no index these cannot be found other than by chance.

The video approach is strangely in keeping with Vermeer's style — relaxed and leisurely. However, in the end the presentation becomes a little boring: there is no interaction apart from choosing which clip you want to look at, so instead you sit in front of the screen like a couch potato, gradually paying less and less attention. But, taken a bit at a time, this is one of the better art CDs we have seen for a while. It is slick and accomplished without being overly pretentious, and has some interesting things to say.

Adele Dyer

Vermeer — an exploration of the artist and his techniques
Contact New Media Solutions
0171 229 1708
Price £39.95 (incl VAT)
Rating ●●●●❍

The Dictionary of National Biography
The Dictionary of National Biography (DNB) is a collection of biographies of notable Britons. It is particularly renowned for the quality of writing by its contributors and is regarded as one of the major historical and literary achievements of the nineteenth century.

It was the brainchild of publisher George Smith and who put the editorship in the hands of Leslie Stephen, father of Virginia Woolf. Stephen published the first volume in 1882, until his health broke down and the project was carried forward by Sidney Lee. When George Smith died in 1917, his widow bequeathed the copyright to the Oxford University Press.

From 1907 the decision was taken not to alter the original entries. This has made the DNB a primary source rather than an accurate and up-to-date reference tool.

With the approach of the 21st century it became clear that a wholly new Dictionary of National Biography was needed. Public funds for this task were made available to the OUP in 1992 and one of the first things it did was to capture the DNB on CD-ROM for use by those compiling the new edition. One result is that the DNB is now available as an electronic edition.

There is nothing flashy about the CD-ROM: multimedia might as well not exist, because there aren't even any photographs. All you get is a sophisticated search engine and the text — and nobody should need more, although some photographs would be nice.

This is a superb and impressive reference source. You can scroll through the articles applying one of several criteria, such as name, occupation and contributor, including a word search. You can print or copy to disk, in ASCII format, a whole article or just selected text. Or you can copy directly into your word processor. The interface is neat and clean, the program is easy to use and has so far been the only software to have impressed a computer-phobic friend of mine who was truly enraptured with it. The DNB is what CD-ROM is all about — it is serious, solid, jam-packed with information and provides many a happy hour of browsing.

Paul Begg

The Dictionary of National Biography
Contact Oxford University Press
01865 267815
Price £350 (plus VAT)
Rating ●●●●●

Get clued-up on Culpeper

Screenplay

Nordic naughties and dark deeds

GT Interactive is set to release Vikings: The Strategy of Ultimate Conquest.

As a viking living in the ninth century, you must secure information from mystic storytellers and flirtatious serving wenches to strengthen your hordes of fighters and weaponry. Simultaneously, you must plan your destiny while scheming, plotting and planning for invasion combat.

There are two options for gameplay style: continental domination or mythical quest.

Vikings will cost £39.99.

Also from GT Interactive comes Hexen: Death Kings of the Dark Citadel. It's an extension pack of 20 all-new expert levels to follow-up Beyond Heretic and is out now, retailing at £14.99. A Win95 version of Hexen will be released in August. Also on the Win95 format front, Mortal Kombat 3 is now available.

GT Interactive 0171 258 3791

Who got the gongs?

Oscars, BAFTA and *PCW* awards aside, in the games industry (or to be precise, the interactive entertainment and leisure multimedia industry) it's the annual ECTS Awards that have real prestige. The Spring 1996 European Computer Trade Show saw Command & Conquer, from Virgin, pick up the award for Computer Software Game of the Year 1995, while Sega's Virtua Fighter 2 won Video Game of the Year.

Psygnosis was voted Developer of the Year with games such as Wipeout and Destruction Derby to its credit. Software Publisher of the Year went to Virgin Interactive Entertainment.

Further award winners at the event were Ocean's Worms, Encarta 96 from Microsoft and Mortal Kombat 3 from Sony. Meanwhile, nominated hardware Sega Saturn and Microsoft Sidewinder Pro 3D were beaten by the Sony Playstation which won the Best Hardware award.

Where there's muck...

New titles from Philips Media to be released over the next six months are an assortment of adventure, racing, strategy and 3D flying shoot-em-ups.

Philips Media is hoping for an animation award for its classic adult cartoon adventure, Down in the Dumps. Despite the game being set in the scene of a stinking rubbish dump, Philips claims it is one of the most beautiful adventure games ever to grace the computer screen. Down in the Dumps has taken French developers, Haiku Studio, over two years to make using SVGA graphics and fully-rendered characters. It is due for release in October and should retail at £44.99.

Gearheads, also from Philips Media, is a strategy game of battling wind-up toys. Pick a toy from your toy box, let it wind up and then release it towards your opponent. All the toys have different strengths and weaknesses so a little strategical planning is advantageous before launching another toy into battle.

The game has a simplistic concept so it's easy to learn, but it's far from easy to master. Its makers believe it could become as addictive as Tetris. With a frenzied musical accompaniment, the hybrid CD-ROM will be available from June retailing at £29.99 (incl VAT).

Philips Media 0171 911 3000

Charts

IMV Creations LEVEL ONE

1	Worms (CD)	Ocean
2	Worms: Reinforcements (CD)	Virgin
3	Dogz (CD)	Mindscape
4	Civilization 2 (CD)	Microprose
5	Duke Nukem 3D Demo (CD)	US Gold
6	Command and Conquer (CD)	Virgin
7	Com. and Conquer... Covert Operations (CD)	Virgin
8	TFX EF2000 (CD)	Ocean
9	Grand Prix Manager (CD)	Microprose
10	Star Trek The Final Unity (CD)	Microprose
11	FIFA '96(CD)	EA
12	Sam & Max: White Label (CD)	Virgin
13	PGA European Tour (CD)	EA
14	7th Guest — White Label (CD)	Virgin
15	Premier Manager 3: Deluxe (CD)	Gremlin
16	Championship Manager 2 (CD)	Domark
17	Virtual Snooker (CD)	Interplay
18	Magic Carpet 2 (CD)	EA
19	Need For Speed (CD)	EA
20	Crusader (CD)	EA

CUTTING EDGE

Civilization II

Price £44.99 (incl VAT) ● **Contact** Microprose 01454 893893

The brain-bashing sequel to a gripping God-sim game.

With SVGA graphics you can fit much more area onto your screen — and this screenshot is only at 640 x 480

It doesn't take long to sum up the strengths and weaknesses of Civilization II, the sequel to Sid Meier's original "God-sim" hit, which sold over 850,000 copies: if you, like many, found the original completely addictive, there's lots more to like in the sequel — Civilization II is Civ with knobs on.

If "Civilization mania" somehow passed you by in 1991, a little description is in order. You begin with a prehistoric tribe in a corner of an unexplored world and you try to advance to the point where your empire spans the globe and you have started a colony in a new star system. But you aren't alone in the world: up to six other computer-controlled civilisations are striving towards the same goal. You have to balance the growth of your population and economy with the need to defend your gains against attack (or the need to crush your opponents). You have to manage your relationships with the other computer players to keep them from attacking you, to encourage trade, and to keep your own population happy.

It sounds complicated, and it is. The rule book is nearly 200 pages long, there's online help in the form of the "Civilopedia", and there's a large wall chart. When you are just starting out things appear fairly straightforward, but you will soon find yourself juggling lots of different variables simultaneously. If you concentrate on building up your economy, barbarian hordes will sweep down and wipe you out. Build up your population too fast without offering them entertainment, and your cities will revolt. And if you have skimped on scientific R&D to build a mighty army of cavalry, elephants and legions, you could find your enemy has invented musketeers or even tanks.

If you thrive on these types of challenges Civilization will give you hours of playing pleasure, but Civilization II will give you even more depth and complexity. There are now 51 different units to move around the map, including paratroopers and marines. Instead of having to choose between peace and war with your neighbours you can have temporary cease-fires and alliances. The combat system has been beefed up so units can now be damaged and repaired. Since computer power has advanced substantially over the last five years, there's more gloss in the game's interface.

I tried the game under Windows 3.1 on a 60MHz Compaq Pentium with 16Mb of RAM and it wasn't at all slow. A few video clips have been added here and there and when you talk to the computer player's ambassadors you can opt to see 3D rendered people.

While both Civilization I and II are enjoyable, there are parts that still frustrate. The way the games handle scientific advances can produce some strange results. Would you guess that in order to build mechanised infantry units you should have previously developed communism and guerilla warfare? Or that you can't invent gunpowder unless you have discovered horse riding? There is a new "development wizard" feature which allows you to enter the unit or building you want to develop and tells you the technologies you need to build one, but even with its aid and the wall chart provided, organising scientific development can be tricky.

The biggest disappointment is the lack of network play: no computerised player, even with improved artificial intelligence, will ever be as challenging or as satisfying to play as a human opponent.

David Brake

System Requirements 486DX/33 or better, 8Mb of RAM, SVGA graphics, double-speed CD-ROM, Windows 3.1 or 95. 35Mb free space on hard disk. 486DX2 66MHz is recommended.
Price £44.99 (incl VAT)
Contact Microprose 01454 893893

One of the less-than-inspiring pieces of added multimedia

One of the many new units you can buy. You can use the coloured text to hyperlink to other parts of the "civilopedia"

Civilization II allows you to create your own worlds if you're tired of the random ones provided

CUTTING EDGE

Abuse

Price £39.99 (incl VAT) ● **Contact** Electronic Arts 01753 672080

Deal the death blow to demented dog-demons.

When I was asked to review this game I was half expecting another 3D Doom-esque pastime to arrive in the post, only with a name like Abuse there'd be even more weapons to hand and a tad more violence. I was right about the latter, but there's no 3D action to be had and not quite as many re-occurring nightmares. But don't be put off. What Abuse lacks by way of graphics is quickly made up for in the annoyingly addictive gameplay.

Abuse is supplied on CD and installs automatically under Windows 95. It even runs under Windows 95 and, unlike so many other games at the moment, doesn't require a Pentium system fitted with a zillion megs of RAM. You'll only need 13Mb of disk space and, once installed, the CD can go back in its box for ever.

The idea of the game is to save the world from yet another terrible fate: this time around, the bad guys are demented dog-like creatures kitted out with heat-seeking missiles and a taste for human flesh. You'll also encounter the machines used to dig the Channel Tunnel and some pretty heavy fire power from like-minded weapons on the walls. It is up to you, as hero Nick, to prevent these monsties reaching the outside world.

Twenty miles below the surface of the Earth, you set out with a somewhat modest laser pistol and a clean pair of underpants. In no time at all you are being attacked from every angle. It doesn't take long, however, until you find serious fire power yourself. There are seven weapons to uncover, each becoming more effective throughout the game.

You control Nick with the keyboard and mouse: cursor keys move him around the screen, while the mouse allows you to shoot in any direction. Along the way you're likely to come across "power ups". These allow Nick to run faster, to be partially invisible and to fly.

When shot, most monsties leave behind crates of ammunition to be picked up — I don't know how Nick manages to carry it all but it certainly comes in useful. Thankfully the laser pistol never runs out, which is reassuring to know because a size 12 boot isn't going to do much damage.

For what is effectively a scrolling platform game, Abuse is unlikely to win any awards for innovation. It is, however, great fun to play and guaranteed to keep you up half the night with its puzzles and seemingly never-ending supply of monsties.

Steven Helstrip

System Requirements
486DX/50 with 8Mb RAM, DOS 5 (runs under Windows 95), 13Mb disk space, mouse, CD-ROM.
Price £39.99 (incl VAT)
Contact Electronic Arts 01753 672080

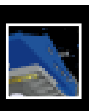
Create your own games and make some extra cash with the level editor

That'll be the machine used to dig the Channel Tunnel

Go on Nick, get 'em!

CUTTING EDGE

Absolute Zero



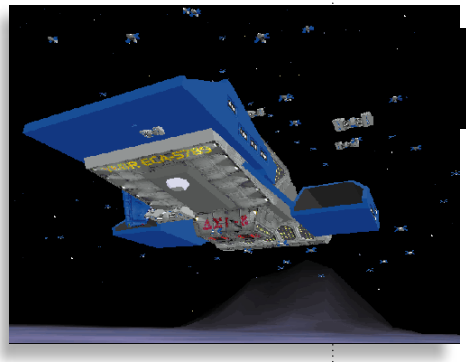
Price £44.99 (incl VAT) ● **Contact** Domark 0181 780 2222

There are a staggering 46 keyboard controls on this non-staggering fly-and-blast game.

Every so often, a game appears that's so fresh and playable it gets more people talking than just the gaming fraternity. Absolute Zero, the latest from Domark, isn't one of them. It's another Wing Commander-esque affair that has you flying around and blasting aliens to bits, a long way from home. This time, you play part of a mining expedition that has uncovered a particularly nasty race lurking on Europa, one of Jupiter's moons.

Having decided to go for the full 350Mb installation for maximum performance, I was more than a tad disappointed with the unimpressive intro sequence. It plodded along at a frame rate that I thought had gone out with the Atari ST — a trait which unfortunately continues into the game. After this, the music kicks in and your mission to survive begins.

The action in Absolute Zero begins with the VR Tunnel interface, where clicking on different modules enables you to read your character's diary and email. Other vital information is at hand too, with regular news updates, team briefings and advice on alien craft.



Spaceships ahoy!

Blast your way around Europa

Being set in a mining colony, the vehicles and weapons at your disposal are, to begin with, somewhat limited. As the story unfolds, though, more powerful weapons are cobbled together from whatever machinery hasn't been destroyed by the baddies. Flying around Europa isn't easy: go too slow and you come crashing down; get too close to the hills and your ship explodes in an unspectacular fashion.

Each mission has a plot which at first isn't always clear, but each time you fail, new hints and instructions are given. It's good to know that your are not alone on the first mission: you are part of a fleet, so if you hang around long enough your buddies will destroy much of the enemy force. Loading each mission takes an eternity, but this at least gives you time to recap on the keyboard controls — there are a staggering 46 to remember.

Absolute Zero isn't as cool as its title suggests: it's slow and difficult to penetrate. While I am a fan of shoot-em-ups and strategy games, I'll be freeing up that 350Mb of storage just as soon as I finish this review.

Steven Helstrip

System Requirements
486/66 with 8Mb, DOS 6.0, SVGA card (S3, ATI or Weitek chipset) and double-speed CD-ROM. Mouse required.
Price £44.99 (incl VAT)
Contact Domark 0181 780 2222

Leisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie
If all permutations of the 4-digit numbers which use the digits 1 to 4 are put into ascending numerical sequence, what number would be in 16th position?

This Month's Prize Puzzle
A nice relatively easy problem this month. Probably a bit too easy, but since we've had a few difficult problems recently, I thought I'd give the readers in the non-genius categories (if there are any!) a chance to win.

● Find a 5-digit number — all digits different — which is a factor of the number formed by reversing the digits. For example, if 54321 divides by 12345, then 12345 would be the required answer.

Answers on a postcard or the back of a sealed envelope (no letters and no floppy disks) to: PCW Prize Puzzle - July 1996, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th July 1996. Good Luck!

Winner of April 1996 Prize Puzzle
All too easy, as one entrant put it. And how right he was, since almost 250 entries were received. Quite a few people said that the Quickie was more difficult (the cryptic message). Anyway, we hope it was fun, and like this month's problem (also a bit easy) it gives less avid puzzlers the chance to win a prize.

The solution was that Alma bought Rubber Bands (3.94), Paper Clips (0.34), Notebooks (3.71), and a postage stamp (0.01).

Our winner this month is Mr Darrell Perrins of Bicester in Oxfordshire. Congratulations, Mr Perrins, your prize is on its way. Meanwhile, to all the also-rans, keep trying, it could be your turn next.

CUTTING EDGE

Global Online accounts and Make-it chips

A jamboree bag of 660 prizes: we've got silver membership accounts, special offers on Global Online subscriptions, and Make-it upgrade chips — all for the taking.

online...

IN THE BIGGEST ONLINE service give-away ever in *PCW*, Crownhawk Ltd will offer registration and one year's subscription to Global Online, silver membership, for each of 150 lucky winners.

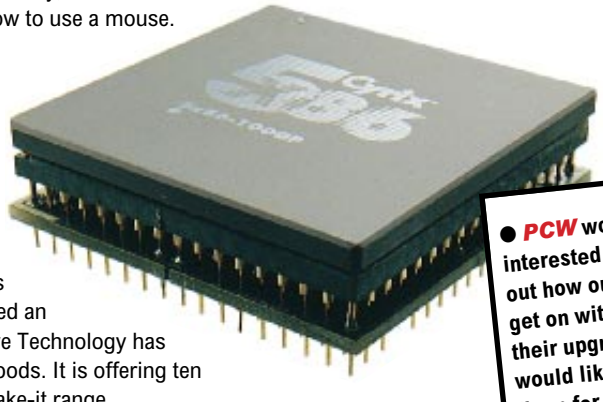
Five hundred runners-up will each win the chance to take up a year's subscription at only £25, the registration fee (saving £48). Once you have your account, there are no online charges and no charges for downloading files.

The services you will find include your own Internet email address and access to thousands of online files covering such subjects as games, education, utilities, music and sports. Additionally, there is online shopping, online conferencing, games and a bulletin service.

The software is user-friendly, even to the novice. All you have to know is how to use a mouse.

Q1 **To win one of these accounts, just tell us what the word modem is short for. Is it:**
1a) **modulator/demodulator**
1b) **modern demonstrator**
1c) **mobile disk emulator**

Make-it upgrade chips



If you just can't deal with your present 286, 386, or even if your 486 is getting you down, you need an upgrade chip, and Improve Technology has really come up with the goods. It is offering ten upgrade chips from its Make-it range.

You can read our review of the Make-it chips in this month's *First Impressions*.

The ten chips we are giving away are:
One 286 to 486 chip
Two 386SX to 486 chips
Two 386DX to 486 chips
Five 486 to 586 chips

Q2 **Here is the question: What does CPU stand for?**
2a) **Co-Processing Unit**
2b) **Central Processing Unit**
2c) **Co-ordinate Placing Utility**

● ***PCW*** **would be interested in finding out how our winners get on with installing their upgrades and would like to talk to them for a possible feature, so please include a day-time phone number on your entry. And don't forget to specify which upgrade chip you would like.**

Rules of entry

This competition is open to all readers of *Personal Computer World*, except for employees and their families, of VNU Business Publications, Crownhawk Ltd and Improve Technologies. Entries must arrive by 19th July 1996. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

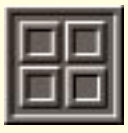
How to enter

To enter the competition, just write your answers on a postcard, or on the back of a sealed envelope, along with your name, address and daytime telephone number, and send to: July Competition, Personal Computer World Editorial, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG.

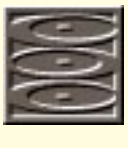
● Remember: We would like to hear your comments when you've installed your upgrade chip, so please include your day-time phone number on your entry.

Hands **On** Contents

OPERATING SYSTEMS



APPLICATIONS



PROGRAMMING

Hands On is the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.

All submissions should be emailed to the author of the appropriate section or snailmailed to Hands On, *Personal Computer World* Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.

We're constantly working to improve the contents of *Hands On*. If you have any suggestions, send them to the Editor at the address above, or email them to: editor@pcw.ccmail.compuserve.com

AND THE REST...

Gone, but not forgotten…

Inefficient uninstallation leaves rubbish behind: Tim Nott provides a cure. And for a bit of R&R, he goes quackers with a kludge for an icon editor.

All applications that bear the Windows 95 logo should come with an uninstallation routine but in my experience it doesn't always work.

Beta software seems particularly susceptible to a half-baked uninstall. One application I looked at recently required an hour of manual deletion and registry pruning to clear up all its droppings.

I take this sort of thing rather personally. If the companies involved are hoping for the goodwill of beta testers and reviewers with a product that may be unfinished and unstable, then they could at least have the courtesy to make sure that the victims have a reliable means of getting rid of it all.

Three common problems seem to be: leaving items in the start menu, leaving registered file types, and leaving items in the uninstall menu itself. The first is easy to cure — open the Start menu (right click on the Start button) and delete the relevant folders and/or shortcuts.

Curing the second involves a visit to the "View/Options/File Types" dialogue from any Explorer or Folder window *(Fig 1)*. Scroll down until you see the offending entry, highlight it, and hit the "Remove" button. Before you start congratulating yourself on a job well done, open WIN.INI and check for corresponding entries in the [Extensions] section; if these exist, delete them as well, otherwise the Registry may add them again next time you start Windows.

Getting items that have been removed off the "Uninstall" list that you see from Control Panel "Add/Remove Programs" involves editing the Registry, but it is very straightforward. Having backed up the registry, run Regedit and go to

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft
\Windows\CurrentVersion\Uninstall
```

Click on the plus sign and you'll see a number of folder icons (called "keys") in the left-hand pane. Each of these should have three corresponding entries in the right-hand pane.

The first should be empty. The second shows the name of the application as shown in the "Add/Remove…" list, which may not be the same as the name of the key. The third shows the command to uninstall the application. Delete the entire key and the entry in "Add/Remove…" will disappear. Note that unlike editing WIN.INI, you don't need to explicitly save the Registry after editing.

Joining the association

While we're in the area, what if an application has stomped all over an existing association? Let's say you have a bitmap editor, with which files such as .TIF, .JPG and .TGA are associated. You install "MegaPaint for Windows Demo Version" from a cover disk and this grabs the association, so that double-clicking on these no longer activates your original editor, even after you've got rid of MegaPaint and removed its entry, or entries, from the "File Types" list.

Sometimes you'll find that the original program will "mend" its associations. If not, and you don't want the trouble of re-installing it, you'll have to create a new file type. The easy way is to double-click on the file and when the "Open With" dialogue appears, type in a description — this is what will appear in the "File Types" list and the Explorer "Type" column. Make sure the "Always use this program…" box is ticked and choose a program from the list.

You might notice that certain file types, in particular those of bitmap editors which can normally handle a variety of formats, have more than one extension associated with them. The neat thing about this is that all these extensions will appear with the same "Type" in Explorer. Both .BMP and .PCX files, for example, default to the type "Bitmap Image" which opens with Paint, but you can't edit or add to this list directly and it doesn't seem possible to specify multiple extensions in a new file type.

Often, this may not be a problem — it's quite useful to have Log or Ini files retain a separate identity from Text files, even though they open with Notepad. At other times, you might want to class ASC files, say, as Text files rather than giving them a separate type. This has the added advantage that any other right-button commands (e.g. "Print") are already set up for you. If you want to create a new multiple extension file type, then create the type with the first extension and close the dialogue. If you want to add to an existing file type, then skip that bit and go straight to Regedit, having carried out the usual precautionary backup.

For the sake of this example, let's say you want to add .ASC files to the type "Text Documents". First, you need to find the middleman, the internal name used by Windows to specify the type. If you look in HKEY_CLASSES_ROOT, which is where all this stuff is stored, you won't see a key for "Text Documents". If you search for it, you'll find it in the right-hand pane, corresponding to a key entitled "txtfile". That's the middleman.

You'll notice that there are two sorts of entries in HKEY_CLASSES_ROOT: extensions, preceded by a full-stop, and the "middlemen" to which the former point. Check the .txt entry and you'll find this points to "txtfile". So all you need to do is add an extension key. Make sure you have HKEY_CLASSES_ROOT selected and expanded, and "Edit/New/Key".

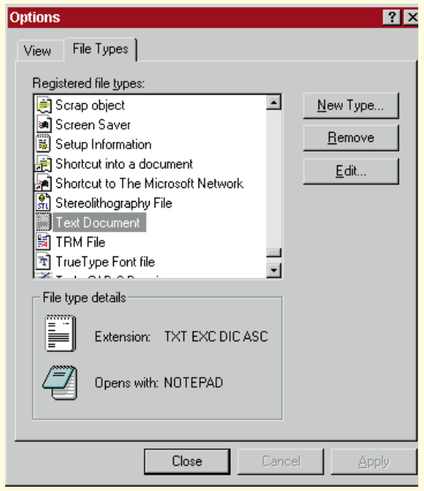


Fig 1 *One file type, several extensions; but how is it done?*

This is just like creating a folder, so type the name ".asc" (without the quotes but with the full-stop) in the space provided. It won't be in the correct position in the list, but don't worry. With ".asc" still selected, double-click on the "(Default)" entry in the right-hand pane and enter "txtfile" (without the quotes) in the "Value Data" box. And that's it. Close Regedit, and you'll find that "Text Documents" now includes "ASC".

Exchange and barf

You may have noticed a singular lack of discussion about Microsoft Exchange in this column. This is because most of the time I try not to think about it.

My PC isn't networked and I use CIX for email. I use the MS Fax driver straight from the word processor for sending faxes, but I'm stuck with Exchange for receiving them. It's slow to load and for some bizarre reason it can take a while for a received fax to show up in the in-basket. What on earth is it *doing* all that time? Up until recently, I thought the dumbest bit of behaviour was the way failed outgoing faxes sit proudly displayed in your "Sent Items" folder as if nothing were amiss. You have to look in your "Inbox" to discover a message from the "System Administrator" that the fax was "Undeliverable".

I've since discovered another equally daft touch. Do not trust the "Received" column — it tells lies. You know that annoying message you get when you've viewed a fax?: "Do you want to save changes to this item?" I couldn't really see what changes I could have made and thought it might be a distant cousin of the Notepad bug, that asks this when you've turned on word wrap but doesn't actually do anything. But I was wrong.

Just out of curiosity I answered "Yes" the other day and was pleased to discover that a fax I'd had to turn upside down was saved that way. Excellent, except that the "Received" date had also changed to that of the save. Call me pedantic, but I did rather expect this column to record the original time and date that the item had landed on my machine, rather than that when I last looked at it.

There is, you'll be relieved to hear, a Way Round This: with the "Inbox" open, go

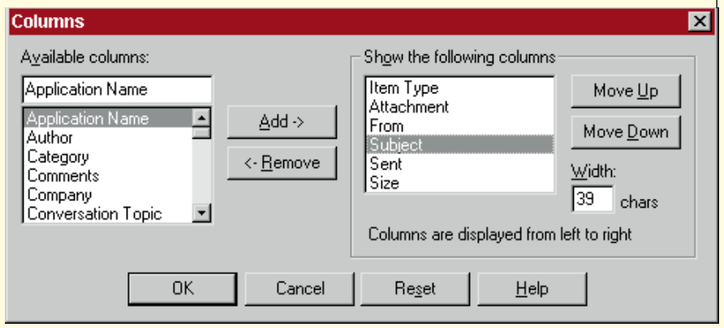


Fig 2 *Customise Exchange with different columns for each folder*

And the waiter brought a tray

In the April issue, we looked at a cluster of utilities that sit in the "System Tray" or "Notification Area" — that recessed bit of the Taskbar at the other end to the Start button.

I've now discovered a rather neat application that lets you add your own shortcuts to the Tray. Stick Brian McCarty's TrayIcon in your Startup folder, and you can have one-click access to your favourite applications. Setting it up doesn't brim with user friendliness — you can't preview icons, for example — but it's simple and it works. You don't have to register it, but Brian would appreciate $5 if you find it useful. It's on our free, cover-mounted CD-ROM under Trayicon.zip.

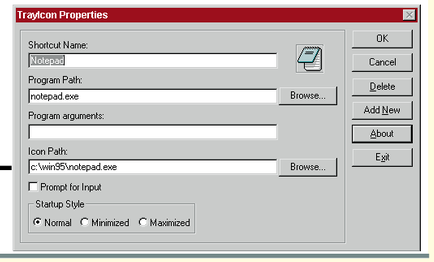


Fig 3 *Add your favourite applications to the system tray*

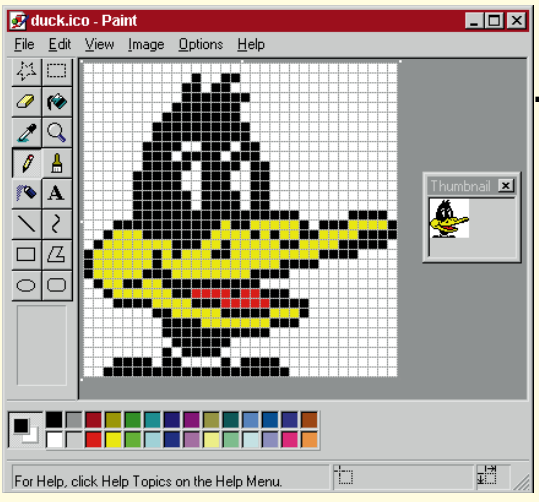


Fig 4 *Roll your own icons with Windows Paint*

to "View/Columns". My goodness, there's a lot of stuff here you never knew you needed, so when you've had a good play with it all, remove the "Received" column from the right-hand pane and add the "Sent" column instead — this doesn't appear to change. You can jiggle the order of the columns with the "Move Up" and "Move Down" buttons, but don't bother with the width: it's much easier to do this by dragging the joins in the column headers themselves.

The fax viewer itself is a rather strange beast. On my system, at least, new faxes seem to default to an unreadable 25 percent view. The trick here is to avoid the pre-set zoom levels and set the view to "Fit Width", either from the Zoom menu or the toolbar button. This seems to avoid the peculiar effect of the sheet "jumping sideways" when you move between pages.

Turn on "Thumbnails" from the "View" menu or toolbar and make sure "Edit/Drag" or the "Hand" button is selected. This way, you can avoid the scroll bars and page up/down buttons completely — it's much easier to navigate between pages with the thumbnails, and on the same page with the "Hand" tool — you just drag the page around.

Just to show I'm fair, there's something I do like about Exchange — the little arrow on the column headings that shows you how they're sorted. Now, if they could make it a little more visible, the programmers could offer it to those who created Explorer. In return, the Explorer programmers could offer the "one click on the heading" to reverse the order, instead of the "right-click/menu" seen in Exchange.

Quacking good icons

A while ago, I was bemoaning the lack of a decent icon editor for Windows 95. I'm pleased to report that I've now found one, from a rather unexpected source. It's free and you don't even have to download it or install it from the cover disk.

Open Paint. Yes, the Mspaint.exe that you get with Windows. Go to "Image/Attributes…" and set the height and width to 32 of those things Microsoft calls "Pels" but which everyone else calls "Pixels". Go to "View/Zoom/Custom…" and pick "800%". From "View/Zoom" again, turn on the grid and the thumbnail view and design away.

Now here comes the incredibly cool bit: the top left pixel sets the "transparent" colour; i.e. any part of the icon that's the same colour, as this will change to that of the current background.

When your tiny masterpiece is finished, save it with the extension .ICO. It's not a Paint option so you'll either have to type it in or rename the file once saved. What you have then is not a true icon (.ICO) file, it's still a .BMP. But it looks like an icon, it walks like an icon, and if you attach it to a suitable sound-clip, will even quack like an icon. In fact, you don't even have to save it with the .ICO extension because if you pick "All files" from the "Type" box when browsing for an icon, Windows will be happy with any .BMP file. It will even resize it if it's not 32 x 32 pixels, though the result isn't usually very good.

This is all part of the same trick as displaying Paint icons as miniatures of the images that appeared in the January issue column *(Fig 4)*. However, it does make browsing far easier, and you'll also find that saving as, or renaming to, *.ICO automatically displays the file as an icon without having to hack the Registry.

So how do you get around the problem of not being able to open "real" .ICO files, or those embedded in another file? Brace yourselves: though I say it myself, this is a kludge little short of brilliant.

First, you need the icon you want to edit displayed full size in a folder. Resize the folder window so that not much more than the icon you want is visible. Alternatively, open the icon browser dialogue and browse/scroll till you see what you want. Grab a "screenshot" to the Clipboard by pressing Alt + Print Screen.

Create a new file in Paint, as before, with the image attributes set to 32 x 32 pixels. Paste the screenshot into Paint and you'll be informed that the image on the Clipboard is larger than the bitmap and asked whether you want the latter enlarged. You don't.

After you've pasted, you'll notice that you can drag the oversize image around until the bit you want is centred in the Paint editing area. Select another tool, and bingo — you've caught the little blighter and can edit and save it.

Take six...

1. Any application	You can open any registered file from the generic "File/Open…" and "Save As…" dialogues. With Notepad, for example, select "All files (*.*)" from the "Type" list and right-click, then "Open" the one you want — let's say it's a .BMP. Unlike a double-click or pressing the "Open" button, this will load the file into a new instance of Paint.
2. Word 7	To get a list of every Word command, go to "Tools/Macro" and select "Word Commands". Scroll down to "ListCommands" and run it. You'll end up with a table showing commands, keystrokes and modifier keys.
3. "Run…" command	Windows remembers the last 26 things that you've "Run" from the "Start" Button. Click on the arrow beside the input box to see a scrolling list.
4. Media Player	Double-clicking on the title bar toggles between hiding and showing the full "set of controls".
5. More Multimedia	If you "Open" rather than "Play" a media clip from the right-button menu, the "player doesn't close when the clip is finished".
6. Paint icons	We covered this in the January issue but I've had so much email from those who missed it, here it is again: open the Registry, and go to "HKEY_CLASSES_ROOT/Paint.Picture/DefaultIcon, then double click on "Default" in the "Name" column. Change the "Value Data" to "%1" without the quotes. Paint file icons will then appear as miniatures of the file.

PCW Contacts

Tim Nott can be contacted by post via *PCW* or by email at **timn@cix.compulink.co.uk**

Dirty **DOS**-ing

Tim Nott gets his hands dirty in DOS and brings news of Calypso, a freeware utility which brings you two of the best bits of Win95.

As I have mentioned before, this column now flies the DOS as well as the Windows 3.1 flag. I haven't given the former much coverage over the last two months so let's rectify that now.

A perplexed Henry Bevan emailed, saying: *"In my c:\ directory, I have got these copies of Autoexec and Config. Which ones can I delete? Autoexec.000, Autoexec.001, Autoexec.bak, Autoexec.bat (I know I can't delete that one…), Autoexec.cdd, Autoexec.dos, Autoexec.old, Autoexec.bat, Config.000, Config.cdd, Config.dos, Config.old and Config.sys (…nor that one)."*

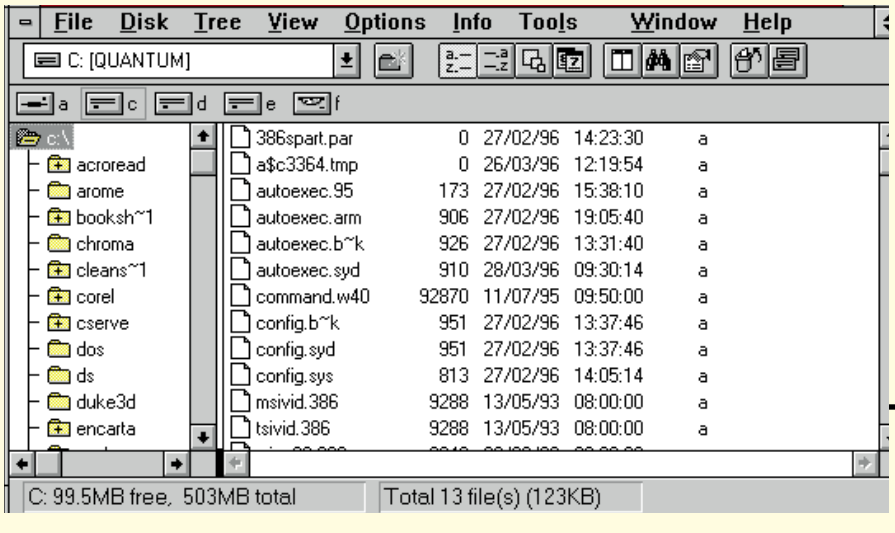
Good question. As Henry and I would imagine everyone else realises, Autoexec.bat and Config.sys are the startup files in current use. So what are all the rest and where do they come from?

The most likely explanation is that an installation of new hardware or software has changed these files and backed up the originals. There's no real rhyme or reason to the naming but if you've recently installed a "Cacophonous Custom Doomblaster" card, that's probably where the .CCDs came from. Any polite installation routine that makes changes to these files should firstly make backups, and secondly tell you what it's called them. Really polite installation routines will comment the new files, something like this:

```
REM - Following line added by
Doomblaster
device = c:\dblaster\bignoise.sys
REM - Previous line added by
Doomblaster
or if it removes a line
REM - device = c:\oldcard\oldcard.sys
- removed by Doomblaster
```

REM statements (REMarks) tell the PC to ignore the rest of the line — they are just there to inform humans. If the setup routine didn't comment the lines it added, you can always compare with the backup and add your own REMs. It's worthwhile doing it at the time as you can then delete the relevant backups. If not, it's worth keeping them around, at least until you're sure everything is working correctly. Though I said there's no rhyme or reason to the naming, there are a couple of exceptions. If you use the Windows System File Editor (SYSEDIT.EXE) to edit these files, it will automatically create backups with the extension .SYD.

The other extensions to watch out for are .DOS and .W40. If you're dual-booting between Windows 95 and Windows 3.1, the system maintains two sets of AUTOEXEC.BAT and CONFIG.SYS, which are renamed on startup. When you're in Windows 95 or DOS 7, then the Windows 3.1/DOS 6 (or earlier) set is renamed with the .DOS extension. When you're in the earlier version, the 95 set is renamed with the .W40 extension, so don't delete these. Just to confuse matters, you may not have these files under Windows 95, as it doesn't need them if "Protected Mode" drivers are installed for all your devices. But if you have; again, don't delete them.



Will the real configuration files please stand up?

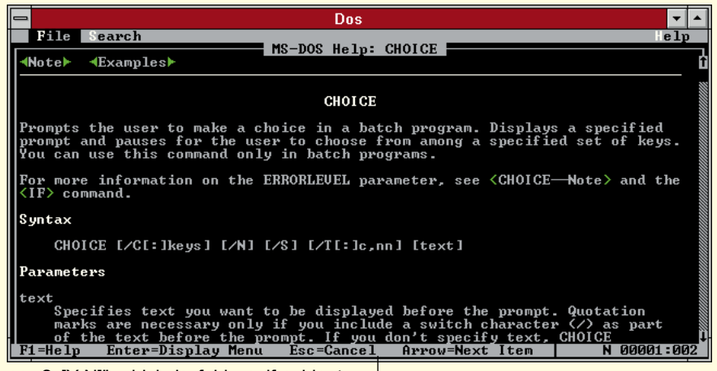
A matter of Choice

Reader Mike Coe asked: *"I believe there is a way of defining alternative startup configurations for DOS. Specifically, I like to boot into Windows by default (i.e. just by turning the computer on and waiting). However, I would like to be able to boot to a DOS prompt as an alternative, just by pressing a single key on start-up, so that AUTOEXEC.BAT is processed in its entirety, except for the last line, 'WIN'."*

Well, there's an easy way and a complicated way to do this. The easy way involves using the MSDOS "CHOICE" command. This comes with version 6.x but was widely available before that. You can only use it in batch files and what it does is prompt the user for a choice, then act according to the "ERRORLEVEL" returned. To do what Mike asks is simple but let's first practice on a dummy batch file. Create this with Notepad, or DOS EDIT and save as "CHOOSE.BAT".

```
@ ECHO OFF
CHOICE /C:YN Start Windows now?
IF ERRORLEVEL 2 GOTO SKIP
ECHO You pressed Y
GOTO END
:SKIP
ECHO You pressed N
:END
```

The "@ ECHO OFF" stops the commands "Echoing" to the display: without this you see everything twice. The next line invokes the CHOICE command and will produce the prompt "Start Windows



The DOS help file gives the full lowdown on this versatile command

now? [Y,N]" which is fairly self-evident. CHOICE returns an ERRORLEVEL depending on the key pressed — the first choice produces 1, the second 2. In this example, we have only two choices but you can have more.

What's important is the way DOS interprets ERRORLEVELS. "IF" statements will be deemed to be true if the ERRORLEVEL is equal to, or greater than, the number specified. Hence, in a simple two-way choice, "ERRORLEVEL 1" will always be true so we have to process the ERRORLEVELS in descending order. The next line, therefore, tells DOS to go to the label "SKIP" if the ERRORLEVEL is two — i.e. the user pressed "N". Note that labels themselves (:SKIP and :END in this case) are preceded by a colon, but references to the labels (…GOTO SKIP) aren't.

If the user pressed "Y", then the "IF" statement is false and the first GOTO ignored. The message "You pressed Y" is ECHOed to the screen, the next GOTO bypasses the SKIP label and the "You pressed N" message.

CHOICE is a fairly user-friendly command — it isn't case sensitive, unless you use the /S switch to make it so, and if the user types any other key it will just sit there and beep until "Y" or "N" is pressed, or Control + C which cancels the batch file.

There remains, however, one further refinement to satisfy Mike's brief. Add the switch "/T:Y,5" to the CHOICE command. This will instruct CHOICE to wait five seconds (values can be from 0 to 99) before returning a default choice of "Y".

So, moving on to the real thing, it's even simpler. If you substitute the following for the "WIN" line at the end of AUTOEXEC.BAT, you'll get five seconds in which to opt for Windows or DOS. Do nothing, and Windows will load as before.

```
CHOICE /C:YN /T:Y,5 Start Windows now?
IF ERRORLEVEL 2 GOTO DOSPROMPT
WIN
:DOSPROMPT
```

Number nine dream

One of my all-time favourite DOS utilities is just coming up for its ninth birthday. It's a text viewer that, unlike Windows Notepad, can display any size file. It will search for text, view in hex or ASCII, filter out junk, split the display into two windows, and you can load a series of files by using wildcards. Type *.TXT at the load prompt, and Ctrl + Page Down/Up will cycle through all the .TXT files in the current directory.

You can change the number of lines and the display colours, shell to DOS without closing the current file, and there's even online help.

Unbelievably, all this packs away into just 8,192 bytes of code. It's called LIST.COM and it was written by Vernon D Buerg in 1987. While it's not — as far as I know — marketed as shareware, the help screen suggests that: "If you find LIST of value, a gift of $15, or any amount, would be greatly appreciated." I don't have an online source, but it's on this month's cover-mounted CD-ROM.

Vernon Buerg's file viewer — vintage 1987, but still excellent

PCW Contacts

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Keeping control

Last month, the Shift key had the spotlight — this month it's the turn of that ever popular denizen of the keyboard, the Control key.

1. File Manager
When dragging files between directories, holding down Control forces a copy, even on the same drive.

2. Program Manager
The same trick works for copying Program Manager icons between groups or to the same group.

3. Clipboard
Control + C copies to it leaving the original, Control + X copies and removes the original. Control + V pastes from it.

4. Write
Control + click in the margin selects the whole document.

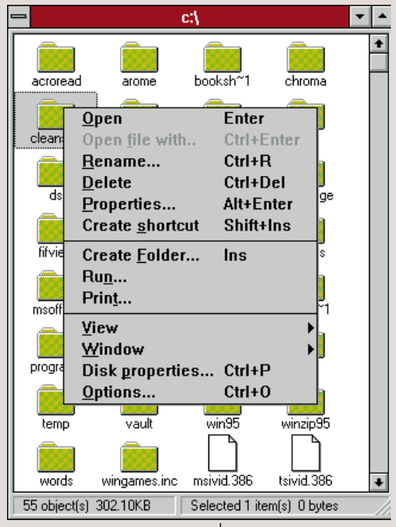
5. More Write
Control + B, I or U toggle Bold, Italic and Underline on and off.

6. Even more Write
Control + Enter forces a page break. All these work with Word, too.

7. Most applications
Control + Z undoes the last action.

8. Paintbrush
Dragging a "cut-out" with the Control key held down leaves the original in place.

Tripping the light Calypso



Nested folders and right-button shortcuts — Calypso brings the Windows 95 look to 3.1

Back in the gloriously GUI-world of Windows, the most fun I had this month was with a prototype model of Li-Hsin Huang's Calypso. This was written in Borland Delphi and there's no complicated installation routine — you just copy the files to a new directory. Run Calypso and two little icons appear at the left of your screen: one entitled "System", the other "Trash". Double-click on the System icon and a window with all your disk drives appears. Double-click on one of these and all the directories and files in the root appear in a separate window, and so on down the line. You can drag files to the Trash icon, drag them between windows and create shortcuts to files or directories on the desktop. And if all this sounds terribly familiar, well, it *is* almost like Windows 95. It's on the cover CD as Calypso.zip, and the author can be contacted as Lhh@doc.ic.ac.uk. Remember though, this is a prototype and hence, freeware. Read the documentation for a list of possible problems. You should also note that it won't work with the "large fonts" option of display drivers and that the Trash Can auto-empties itself on exit.

Mixed marriage

Apple's Copland and IBM's PowerPC-based OS are both floating free so how about a relationship, proposes Chris Bidmead. Plus, NTRigue and NeXT.

Apple doesn't get much space in this column, for the reason that its venerable co-operative multitasking OS (at heart, on a par with Windows 3.1) doesn't in my view qualify as a modern 32-bit operating system.

The heart of the matter

I've certainly been looking forward to Copland — in fact there's an Apple PowerMac here waiting to run it. Last year we heard that the launch of this microkernel-based truly pre-emptive multitasking operating system had been deferred until the middle of this year.

In January, amid the financial crisis at Apple that finally shed Michael Spindler, a leaked internal memo from Apple's Senior VP, David Nagel, revealed that the company was freezing all new spending on research and development. Okay, this was qualified by the word "temporarily", and in any case, we reassured ourselves, Copland as a long-running development project probably didn't qualify as "new spending". And Apple's PR people were keen to point out that the new CEO, Gilbert Amelio, was no mere bean counter and wouldn't be operating a slash-and-burn policy to get Apple back into shape.

I very much hoped that this would be true. Apple, as a company and as a computing environment, is different. And if this column is about anything, it is about exploring the merit and the merriment of just these kinds of differences. Different 32-bit multitasking operating systems can mix and match in a way that the rigid old 8- and 16-bit operating systems never could. I want healthy plurality.

But is Apple's heart still in the game? Earlier this year I had a long chat with Nick Graves, Apple's European Marketing Manager, and asked him about the slippage of Copland, hoping to hear that it was now steaming ahead on all cylinders. Instead, I got some intricate foot-work. "We never announced a date, so when people say Copland has 'slipped', that is really a comment about perception," he told me. Ah, I see. "Copland is probably the largest system software project ever undertaken in the personal computer industry," he continued, "a massive, massive project, so clearly the timescales are long."

This really wasn't what I wanted to hear. When it comes to "massive, massive projects" Apple has already been there, done that, got the T-shirt. In the mid-eighties Apple got caught up in the development of "Pink", the object-orientated buzzword operating system to end all operating systems, which was so slow coming and such a drain on resources that it nearly put paid to the entire company. And so it would if the then CEO, John Sculley, hadn't managed to palm Pink off onto IBM as part of the joint venture they set up together.

Pink became Taligent, fizzled down from a be-all, end-all operating system to just another application development environment, changed its name (unmemorably) to CommonPoint, got absorbed into IBM, and, er, is now just a tiny footnote in the history of computing. And here was Nick Graves telling me that Copland was bigger than Taligent.

"The man-hours associated with Copland are far greater than something like Taligent," insisted Graves. "I would stake my life on that." Interesting choice of words, Nick, but it's clear that Copland is more than mere vapourware.

"Currently, we have what we call the 'Developer Tools' release of Copland out with people who, er, write developer tools," he told me. "There will be a wide developer release this spring. Then through the middle of the year there will be a release into customers' hands. We're calling it 'the customer evaluation release'— with such a big project it's very difficult to talk about alphas and betas."

What I wanted to know was, would Copland be out, released, finished, this year. And what he was telling me, translated into English, was "No".

Gilbert Amelio says it more straightforwardly. He told Wall Street analysts that Copland will be "a 1997 event" — so now we know.

Or do we? It seems possible to me that Copland may not turn out to be an event at all. A day or two before Amelio "clarified" the Copland schedule, the news came through that David Nagel had left the company. Nagel was in charge of R&D and I'm very concerned that this might mean the "temporary freeze" in that department is destined to become permafrost. Frankly, I think without Copland, or something very much like it, Apple is going to end up as a toymaker.

Meeting Merlin

As I write I am due to go to Nashville, Tennessee, to spend a week with IBM when the new version of OS/2, codenamed Merlin, is due to be unveiled.

At the moment, the only thing I know about Merlin is that it's not the cross-platform, microkernel-based OS/2 we were promised by IBM last year. Merlin is Intel-only and like Warp, it's predecessor, stays tight and efficient by avoiding the message-passing interfaces required by microkernel architecture.

There is a microkernel OS/2 in existence: it's the PowerPC version which was quietly released last December. IBM has said it will leave it alone for a year and then, if there's a market for it, the company will consider further development. This is a bit like leaving a weakling child on a mountain-top in winter and saying you'll drop round at the same time next year with some food and blankets — if they're still needed.

Codenamed Merlin, IBM's newest OS/2 will be out sometime soon, voice enabled, and with a different look and feel

Good news for Linux

Last month I mentioned a reader, Boris Stojnic, who thanked me for getting him interested in Linux. Since then I have discovered that Boris, who it turns out used to publish *Amiga World* in the former Yugoslavia, is pursuing his vision for Linux by establishing a new magazine, *Linux World*. The first issue should be out by the time you read this.

● *Linux World (subscriptions), 66 Maxted Road, London SE15 4LF (tel 0171 771 6170); email boriss@cix. The magazine's email address is: info@edream.vossnet.co.uk*

Running NeXTStep on a 486

I'm conscious that NeXTStep is a luxury not everyone can afford, so I've been writing about it with some caution. I love it, but then, I don't have to pay for the hardware and software. If I did, Linux would probably be my OS of choice. But hardware prices are coming down and today's so-called "entry-level" machine, at least as far as the processor is concerned, actually has a higher spec than the 100MHz 486 Canon object.station I have here on my network, running NeXTStep. Perhaps that's why I'm getting so many queries from readers now about NeXT. One such comes from Dominic Hopton (dombo@darkhos.demon.co.uk). He has a 486DX2 66MHz with 16Mb of RAM and wants to know if he can run NeXTStep on it. Here's the full spec:

- 16Mb RAM
- Adaptec 1542cf SCSI card
- 2 x 500Mb SCSI Seagate hard drives
- SoundBlaster 16
- NEC Atapi 1.2 Compatible CD-ROM
- USR V.34 modem
- Cirrus Logic 5426 VLB Gfx card with 1Mb, upgradable to 2M.
- AMI BIOS
- 14in, 1152 x 864 refresh rate monitor

NeXTStep is broadening its hardware base all the time as new drivers come on line. To get the latest news on this, I checked with Paul Lynch of P&L Systems who's been helping me set up my own NeXTStep installation. Here's what Paul calls his generic-type answer, because obviously it's hard to be too specific when you don't have all the details:

Memory: 16Mb is okay. "You'll get noticeable swapping, but it'll run," says Paul. "Not as bad as Windows with 4Mb. About the same as NT with 16Mb. Commercial customers usually have 32Mb as a minimum."

Paul considers that the processor, the Adaptec card, the SoundBlaster and the hard drives are all great. Personally, I'd have thought the processor a touch on the slow side.

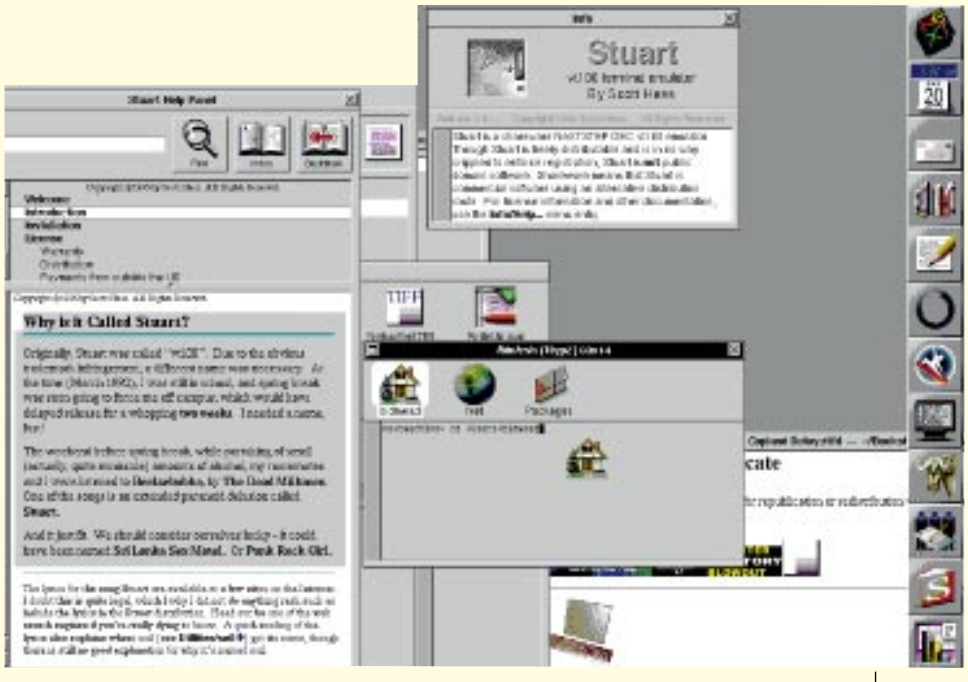
The NEC Atapi 1.2 Compatible CD-ROM? Paul tells me that NEC isn't on the supported list, which means that it may or may not work. "Atapi CD-ROMs can be made to work, although you will need to ftp some driver disks from NeXT before you can even attempt an install."

The USR V.34 modem is fine, but only for data, as it's not supported by any of the fax software. The Cirrus Logic 5426 VLB Gfx card is okay-ish, says Paul. "There is a GD542x driver: this supports 2-bit greyscale, possibly up to 800 x 600. SoftPC (the DOS emulator) and NEXTIME (the movie module) don't work on it properly. You really want 1,024 x 768 16-bit colour to feel happy."

The AMI BIOS should be no problem. The monitor is probably a little small, thinks Paul. "Most people use 17in as a minimum."

So, some hardware swaps might be necessary but on the whole NeXTStep will run. Personally, I'd go for 32Mb. On top of that there's the price of the NeXTStep operating system, which, as I say, isn't cheap. NeXTStep is £530 plus delivery and VAT. Academic pricing is £220 plus delivery and VAT.

● *If anyone wants to follow this up, they can talk to Paul Lynch directly on 01494 432422.*



Stuart is a shareware application written for NeXTStep, and a great example of how old-style command-line computing can work with modern drag-and-drop

See what I'm thinking? Here's IBM with this microkernel, PowerPC-based OS for which it has no market and doesn't know what to do with anyway. And there's Apple, with an installed base of something like a couple of million PowerPC machines, struggling to bring down to earth a "massive, massive" operating system project that seems to be stalling in mid-air.

As it stands, OS/2 is not what Apple users want. The OS/2 interface, already Mac-like, could probably easily be fixed and would bring much useful object-orientated, drag'n'drop magic to the party.

The big problem with OS/2 is that it won't run Mac users' old apps. But microkernel operating systems are designed to make backward compatibility like this easier to implement. If Apple and IBM aren't sick of trying to work together after the Taligent fiasco, it's just possible there might be some spark to be struck here.

NEC to the rescue

In my previous column I just managed to squeeze in a screenshot of NTrigue, which I finally got working. I blamed Windows NT for the hold up because its "rsh doesn't work in a way consistent with Unix".

I apologise to Windows NT. The problem was at my end. The version of NTrigue that Insignia Solutions had sent me included printed instructions that got you as far as installing the software, but stopped short of actually telling you how to set up Windows sessions so they can magically pop up on every workstation on your network capable of running the X Window System. Eventually, I stumbled on a .PDF file on the CD-ROM which took me though the rest of it.

I did promise more on NTrigue this month but in the event I deferred work on it for a week while I waited for the delivery of a new Pentium from NEC. It's a PowerMate V100 with a 1Gb hard disk — a modest enough spec these days but a giant of a machine compared with my network of ageing 486s.

I'd first installed NTrigue on a 25MHz Mitac with 16Mb RAM, and was pleased to see it working at all. In fact it's quite usable, bearing in mind that I'm the only user on this network. But with the PowerMate, I hope to see some real speed. I say this, because just as I was setting up the PowerMate on the network the news came through from Insignia Solutions that version 1.1 of NTrigue was on its way. It seemed sensible to wait for that, particularly as the installation of NTrigue involves a fairly convoluted ritual with licence numbers.

You install it, run a validation program which provides you with a magic number derived from the machine and the date and then fax that number to Insignia, which then faxes you back another number to unlock the software. The catch is that you have to enter the number the same day you get it or it becomes invalid.

So hopefully, next month, I'll have NTrigue 1.1 safely installed on the PowerMate, and we can take it from there.

NeXT: the guts under the GUI

The great thing about NeXT as far as this column is concerned is that underneath it's a reference-quality Unix, while on top it's a beautiful object-orientated interface that's more than just a pretty face.

Here's a great example of how the interface and the underlying operating system marry up. The screenshot alongside shows a shareware application written by NeXTStep veteran, Scott Hess. It's called "Stuart".

Essentially, it's just a terminal window along the lines of xterm or the Terminal app that comes as standard with every NeXT machine. A terminal window like this emulates the old DEC VT100 dumb boxes that used to be the most common way of communicating with computers. It's what you use on an operating system like NeXTStep or Linux when you want to punch your way through the GUI to get to the guts and do some raw character-based computing.

Stuart is no dumb terminal, though. Optionally you can give it a "shelf": a subclass of the shelf in the NeXT WorkPlace Manager, also used in the Librarian and the Finder. Icons of files or folders can be dragged from the WorkPlace Manager and dropped onto Scott Hess's shelf at any time while you work inside the terminal.

Why would you want to do this? Well, one of the boring things I find when working in char-based Unix is switching around between various directories. Okay, I know there are some nifty shortcuts to do this in shells like csh and bash — one day I really will learn them. Meanwhile, on the NeXT machine I just pick up a directory icon, drop it onto the terminal window and it automatically produces the cd <new directory> on the command line.

This odd meeting of old-style computing and modern drag-and-drop happens elsewhere in NeXTStep, too. Any time an application pops up, the standard file selection panel allows you to choose a filename for loading or saving: you can pick up a directory or file icon and just drop it on the panel, whereupon the appropriate entry appears in the text entry window.

PCW Contacts

Chris Bidmead is a consultant and commentator on advanced technology. He can be contacted on **bidmead@cix.compulink.co.uk**

Imperfect timing

Tim Phillips gives his overview of the new beta version 7 features included in PerfectOffice and WordPerfect.

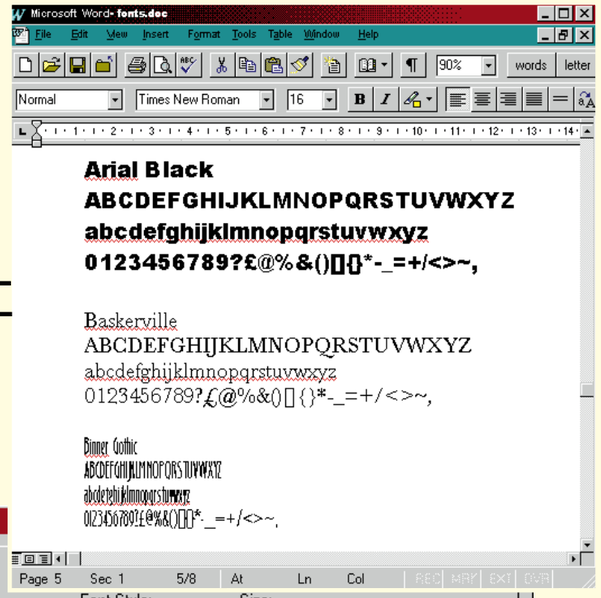
If you've been waiting patiently for me to review WordPerfect 7, then I'm sorry: you'll have to wait another month as I've only just received my beta copy. But I *can* fill you in on the new features of the Corel-owned PerfectOffice 7. At this point, I'm not going to tell you how good they are as I'll need longer to work that one out.

WordPerfect 7 has finally woken up to the Internet! There's an Internet publisher supplied as an integral part of the package. It's easy to make HTML documents using the Publisher, which uses a series of pull-down menus to give you the elements of HTML markup. Conversion from HTML to WordPerfect format is in there, too — not revolutionary, granted.

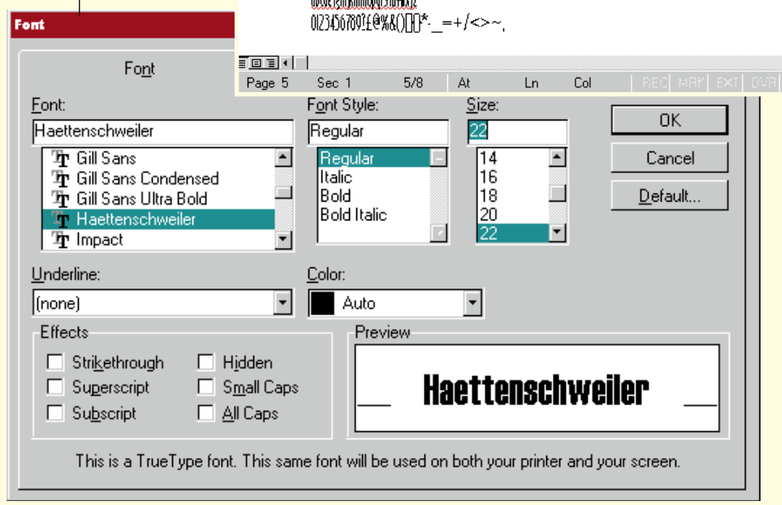
Spell checking, grammar checking and the Thesaurus are now in one dialogue box, so if you use all three it makes the whole thing easier. On the other hand, if you don't use all three (which, judging from my postbag, could apply to most of you) this isn't an improvement.

Perhaps the biggest benefit for users is the amount of common applications in the suite. There's a neat, common address book — good for small businesses but irrelevant for larger ones — that has made the mailmerge much better. Corel claims that PerfectOffice has more common code than any other suite.

The remainder of the improvements are playing catch-up to Word and Word Pro: improving the automatic correction and autoformatting, including a Quick-Finder and a right-click context sensitive menu, adding tabbed dialogue boxes to contain all these functions, and long filename support. There's rotated text in tables, but as you can guess, I'm struggling to find a good reason to buy PerfectOffice 7.

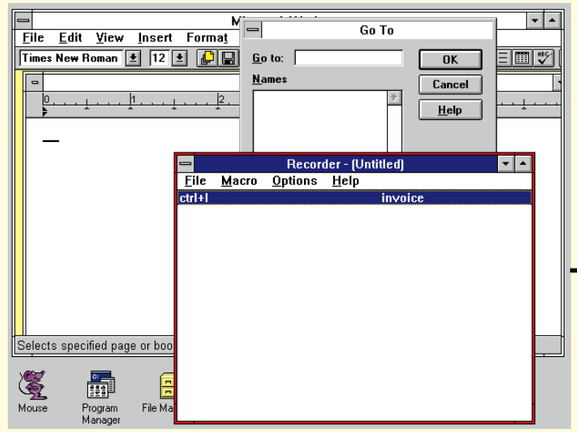


The output of the fonts macro. So congratulations to young Bill Gates of Redmond for this creditable effort



The Format, Font dialogue box with a preview font. Congratulations to young Bill Gates etc etc

First thoughts are: it's fine if you desperately want to retain your WordPerfect commitment in a 32-bit environment; but it does nothing more than Word can do. I'm hardly a cheerleader for Microsoft but I predict that it will not displace many Microsoft Office sales. Like Office, PerfectOffice has traded up in its hardware requirements and we've ended up with word processors that react sluggishly on anything below a Pentium.



Recording a macro using Recorder, Windows 3.11 and Works. Use this for the invoice numbering solution

Lista' fonts

Several of you have helpfully pointed out that the macro to display all your fonts (*Hands On*, June) has already been supplied by Microsoft. Well done, Microsoft — you don't get a prize, as you're richer than Croesus already. The macro in question (shown in *Fig 1*) is found in the Word 6 template called Macro60.dot.

It takes a few minutes to chug through all your fonts but the result is a document which shows them all, with names. This is only useful if you print it out because Word shows previews of fonts in the Format, Font dialogue box.

True to type

Here's something for TrueType fans: Formula Solutions of Ilford is offering you the chance to get a company logo produced in TrueType format. It's a good, simple idea and the fact that I didn't think of it first shows that I'm just not cut out for this entrepreneurial stuff.

You supply the logo to Formula and in return you get a TrueType font — basically, versions of the logo instead of letters. You choose the logo characters just as you would choose a font in your word processor and the logo is in your document: scalable, with no loss of definition.

This additionally solves the problem of document growth that some of my correspondents experience — Formula estimates that this adds about 30 bytes per logo to a document. Since when did a graphic file occupy only 30 bytes? On the down side, the logo needs to be mono — but the output is exceptional. If you're interested phone Formula on the number shown in our Contacts panel.

Look — no macro!

William Barneby, of Madley, adds a macro-free solution (see page 286) to the invoice number challenge (*Hands On,* April and May) for all you Works for Windows users. This uses Recorder, the much ignored keystroke macro generator that Windows 3.x uses.

If you remember, the challenge is to produce a document which can be used to generate invoices: it automatically assigns a sequential number to the invoices as they are generated.

1. Open a blank word processor document.
2. Embed a two-column spreadsheet on the right-hand side, stretching the length of the page.
3. In cell A1, type '0'.

Fig 1 Out for the count

```
Sub MAIN
CR$=Chr$(11) + Chr$(9)

FileNew.NewTemplate = 0,.Template="Normal"

MyFonts=CountFonts()
For count=1 To MyFonts
        A$=Font$(count)
        Font A$,16
        Insert A$+CR$
Insert "ABCDEFGHIJKLMNOPQRSTUVWXYZ" + CR$
Insert "abcdefghijklmnopqrstuvwxyz" + CR$
Insert "0123456789?£@%&()[]{}*-_=+/<>~," + CR$ + CR$
Next count
End sub
```

Tim's Macro Club

Teleprinting

Two letters in a matter of days from the enthusiastic Graham Brown of Brent Cross about his macro for Word 6 called Teleprinter. It's one of those simple but useful ideas that I never have: the macro simply types your document back to you, with the speed being dependent on what value you use in the loop "For y=1 to 25:Next". More than 25, it's slower. Less than 25, it's faster. The idea, Graham says, is to help with proof-reading, or to make a demo screen.

```
Sub MAIN
EditSelectAll
a$ = Selection$()
FileNewDefault
For x = 1 To Len(a$)
Insert Mid$(a$, x, 1)
For y = 1 To 25 : Next
Next
End Sub
```

Now, I'm not answering any email from users who say they can't get it to work… but, hardly had I read Graham's first letter than another one hit my desk — with a revision. The revised version contains pauses for punctuation. This month's prize goes to Graham. I've found this macro extremely useful already, as I edit a lot of copy and reading it on screen can be a nightmare.

```
Sub MAIN
EditSelectAll
a$ = Selection$()
FileNewDefault
For x = 1 To Len(a$)
Insert Mid$(a$, x, 1)
If Mid$(a$, x, 1) = "," Then For y = 1 To 300 : Next
If Mid$(a$, x, 1) = "." Then For y = 1 To 600 : Next
If Mid$(a$, x, 1) = ";" Then For y = 1 To 500 : Next
If Mid$(a$, x, 1) = ":" Then For y = 1 To 400 : Next
For y = 1 To 10 : Next
Next
End Sub
```

The next challenge in developing this is to make it stop for changes. There needs to be an interrupt command to allow you to stop the macro executing so that you can edit the document. At the moment, you need to run it from the Tools menu to get the macro controls and press Escape to stop the macro, which is a bit clunky. More work on this one, please — and versions for other platforms. It's not a taxing concept, so I'm expecting a good response.

More on A5 booklets

To recap: Alison Walley wanted to print word processor output as an A5 booklet. I've had a letter from Jean Elliott, who actually does this to produce booklets for Word users who she trains. Warning! Exhaustive process follows:

1. Make a landscape template called "Bookpage" which has wide margins so that the text area is 4.35ins wide.
2. When you finish each page, make that text into a piece of AutoText and call the AutoText by its page number. Remember — to make AutoText you highlight the text and select Edit, AutoText.
3. Use the template organiser to transfer the AutoText items to another landscape template, which is set up with columns 4.35ins wide. Start a new document and type the page numbers in printing order, with page and section breaks to match. This is a bit subtle, as Jean shows. For a 24-page booklet, the order would be:

```
11<CR><CB>12<CR><PB>13<CR><CB>10<CR><ES>
09<CR><CB>14<CR><PB>15<CR><CB>08<CR><ES>
07<CR><CB>16<CR><PB>17<CR><CB>06<CR><ES>
05<CR><CB>18<CR><PB>19<CR><CB>04<CR><ES>
03<CR><CB>20<CR><PB>21<CR><CB>02<CR><ES>
01<CR><CB>22<CR><PB>23<CR><CB>00<CR>
```

where <CR> is a carriage return, <CB> a column break, <PB> a page break, <ES> the end of a section, and page 00 the contents page.

4. Move to each number and press F3. The AutoText item is automatically inserted.
5. Page numbering: set up a one-row, three-column table as a footer, using odd and even page footers and section breaks.
6. Print the first page of each section on one side of A4; the second page on the other side.
7. Lie down in a darkened room.

So what if it's not the most elegant solution? It gets the job done. I'm happy to hear of any more elegant methods but I'm not sure there are any.

WordPerfect, A5 booklets and Initial caps

Three of my most favourite things in one! I'd better get on with it or I'll wet myself with excitement. Following on from Jean-Luc Addams' excellent WordPerfect 5.2 A5 booklet macro last month, he has written a follow-up macro to allow you to use drop caps in a document. I have put it on this month's free, cover-mounted CD-ROM — I've left the explanation in, but when retyping you can leave it out.

4. In cell B1, type '1'.
5. Reduce the width of column B to zero.
6. Select any cell in column B.
7. Save the document as a template.
8. Record the macro (*Fig 2*) in Recorder. If you haven't done this before, simply start up Recorder and start recording. It will record your keystrokes, which should be as shown in *Fig 2*.
9. Customise your invoice template and save it under the same name.

To use the invoice, open the document and the last invoice number will be in A1. Double-click on the spreadsheet column and run the macro, which will add one to the number and save the template for next time. Complete the invoice and then save as a separate document in an invoice directory.

That's it for this time. Note my new CIS number, shown in the Contacts panel below. I won't be answering mail on the old address, so please use the new one. I much prefer my Internet address anyway!

Fig 2 A macro-free solution

<F5>	(go to)
B1	(cell containing seed number)
<ctrl-C>	(copy)
<left arrow>	(moves to A1)
<alt-E>	(opens edit window)
S	(paste special)
A	(add to value in A1)
<enter>	(confirm and close menu)
<ctrl-S>	(saves template with new number)

PCW Contacts

Contact **Tim Phillips** by surface or airmail to *PCW*, otherwise email him at his new CIS address
CompuServe 104047,2750
or **wong@cix.compulink.co.uk**
Formula Solutions 0181 252 4444

It never **rains**

An everyday story of Met Office folk, told by Stephen Wells. Plus, at last, some good moos about cows...

On the clifftop near where I live is a brightly-painted box on legs. Every day, a man on a bicycle arrives to open it up and take readings from the instruments inside. There are hundreds of these volunteers across the country, all feeding in valuable information to the Met Office. I received an email from one who runs a West Midlands co-operating station within the Met voluntary network.

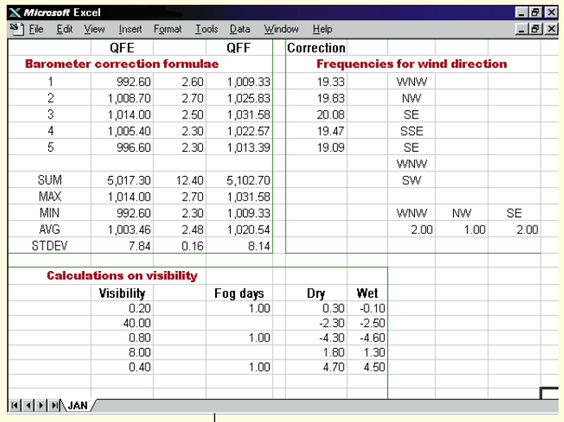
Cedric Geoffrey Roberts wrote: *"I have been watching comments in your column on importing SuperCalc data into Excel. I have been well satisfied with SuperCalc 5.5 for DOS. It has given me an ideal base for producing data analysis. But I have been increasingly worried about the eventual demise of DOS. I would like to move over to Excel which is extensively used by the Met Office but have been put off by the prospect of having to redo all of my spreadsheet files to comply with the new software. When I had to move over from BBC to PC, I had to re-plan the whole system.*

"Each month I complete an 11-page spreadsheet with rows for each day. Pages 1 and 2 are the main data pages which are entered manually or filled with logged information imported from CSV files. The other nine pages analyse this data with scores of formulae. They calculate the MSL (Mean Sea Level) pressures from the station level barometer readings, humidity, dew points, and numbers of days of snow, sleet, frost and much more.

"As a pensioner, I'm dubious about spending over £200 on Excel if it will not work with most of the formula. I'm particularly concerned about SC5.5 DCOUNT formulas. Data for just one year is broken down into four seasons, and then every month has an 11-page spreadsheet."

I suggested that he send me a range of his spreadsheet including all the formulas which bothered him. I asked him which version of Excel the Met is using and queried if they didn't have a technical support service or help group for their volunteer stations.

When the disk arrived — accompanied by the widest print-out I've ever seen, consisting of two pieces of 14.5in continuous listing paper stuck together — I ran it on my old 386SX which has SC5.5 loaded.



A tiny section of a very large spreadsheet used by someone who is trying to do something about the weather

There were DCOUNT formulas like:

```
DCOUNT($BB$1:$BB$11,0,BE1:BE2)
```

A lot of AND statements, like:

```
AND(BB2>=-15,BB2<=-10)
```

And some daunting IF statements like:

```
IF(U17>=0,AN17-(.000799*1000*(T17-U17)),AN(17(.00072*1000*(T17-U17)))
```

There were also a lot of formulas with ^ (to the power of) signs in them.

But it's seldom because of complex maths that you run into import/export problems. It's the translation of dates, some functions or names. And Mr Roberts is not using any date-formatted cells, unusual functions nor any range names.

Fig 1 shows an example of some of the categories, though I've moved things around and reformatted some revised data in Excel 7 because these days even the weather is probably copyrighted.

As documented in the CA-SuperCalc Version 5.1 User's Guide, you save in the normal way but, when the file name appears on the edit line say, JAN.CAL, you just edit it to JAN.WKS and press Enter. No special exporting: just a save with a different extension. SuperCalc on its own initiative goes into Export mode and translates the file. Now it will be recognised by any version of Excel or Lotus 1-2-3.

Then I loaded the file into Excel Version 4 on my old machine and Excel 7 on my new one and checked that the formulas were producing the same results as before. No problem. As a reader has previously mentioned, the type comes out in blue, but it's easy to change that by selecting Format, Font, Color (sic), Black.

I was able to email back to Mr Roberts that I could foresee no translation problems other than that separate SC5 pages would have to be saved as individual files. But I suggested that his biggest expense was going to be the hardware for running the latest version of Excel. At the moment, apparently, the Met is using Excel 5 but, like the weather, I expect they'll change soon.

Anyway, the final word from Mr Roberts suggested he is moving on up. He said he has ordered Excel and looks forward to analysing the 40 years of data held at his station.

Date	Fat	Lact	Prot	F P D	Urea %	Cells	TBC	Anti-Biotic
1-Feb-96	3.63	4.71	3.36	543	0.0310	165	5	pass
8-Feb-96	3.75	4.65	3.35	538	0.0350	191	14	pass
12-Feb-96	3.52	4.67	3.43	544	0.0260	238	12	pass
23-Feb-96	3.62	4.69	3.37	546	0.0310	241	20	pass
28-Feb-96	3.47	4.70	3.35	544				
Ave	3.60	4.68	3.37	543				

Excel will automatically create a useful form for data entry. It can also be used for searching

The cows came home

I blame myself for leading Farmer John astray. In the April column I talked about three ways of creating a custom dialogue box in Excel 7. All of them involved using VBA (Visual Basic for Applications).

I received an email from Mr JA Page asking how you persuade an Excel worksheet to display the data you've already entered in such a home-made dialogue box. "I have spent hours searching for the required command to no avail." Ah — the guilt one feels on receiving such heart-rending appeals.

In a follow-up email he sent a listing for his macro and a further query: "How do I clear the data entry boxes, hopefully after the data has passed to the spreadsheet?"

Fortunately, John is on the Microsoft Network so I was able to get him to send me his complete Excel 7 workbook without posting a disk in.

The first page of his workbook gave the annual averages of eight different tests on his cows' milk. These were calculated from the next 30 pages which give the monthly results of those tests, all through

Down the wire

In the February issue, I illustrated the MS Excel 95 Forum page which you can access via the Help option in Excel 7, assuming you're on the Microsoft Network.

Time moves on. With Microsoft's Internet Explorer 2 (which you can download for free from MSN), or the Beta Version 3, you can now reach the Excel Web page which is just a click away from the MS Office Web site.

Finding the information you need is now so much easier, with clearer groupings and better indexing. Downloading is easier too. Icons we can all understand appear by each item. A document item is obviously one you can read online or download with the familiar File, Save As action. Free macros and things have a little disk-drive icon. Click one of those and the item is downloaded. Finally, comms is almost as easy as switching on a TV set.

You don't have to worry about paying BT for all those Web page graphics to come down the line. After the first time you view a page, you can save it in the Favourite Folders file (along with the *PCW* Web site) and open it up in a flash.

To think: all those years I never owned a modem and now I use it more often than my CD drive. I expect I'll be buying a microwave oven next.

The Excel Web page: just a click away

'94, '95 and to date in '96.

Then he had a series of DialogSheets showing graphic designs of individual dialogue boxes for each milk test item. And finally, some module pages with Show statements in them.

With further communication, I discovered that John had no real desire to start a DIY training scheme in VBA but just needed a quick solution for entering the milk samples to help in his everyday work. So, although to answer his specific questions, I told John about changing the Value property of the target cell, and defaults in the EditBox object, I also made him up a new sample workbook with the simple instructions for creating and using a Data Form.

Fig 2 shows John's basic table for February this year with a data entry form which Excel will create instantly for you. In Excel 4, you had to define a database before you could make a data entry form. But since Excel 5 you've been able to create one for an ordinary worksheet.

Assuming there is no blank row between the entered results and the heading labels, you can click in the first blank cell below the entered results and press Alt+d,o (or choose Data, Form on the menu bar). If there is a blank row below the labels, as in the illustration, just choose the first cell in that blank row. Not only does this immediately produce a data entry form with labels for each item, but it gives you some options which it would take you a long time to program on your own.

Now you can press Alt+w (or choose the New button) to enter a new record and press Cltr+; (semi-colon) for today's date. Press Tab to go on to the next data item (Fat, here). And so on to end of the Form. Then click New. Enter the next date. And so on to the end. When you've finished entering the records you just click Close.

At any time you can show in the boxes the previous or next record. You can also click Criteria and enter a filtering formula like >15/2/96 in the Date box to just show those records dated after Feb. 15th.

As John said in his final email, "Why use a sledgehammer to crack a nut?" I could tell he was happy to get the good moos.

Weeding out

Speaking of writing unnecessary macros: I have received several emails on the theme of "How do I check an Excel database for duplicate records?"

If you have Excel 5 or 7, it's easy. All three of the following options start out by choosing Data, Filter.

TO FILTER OUT DUPLICATES you then choose, "Advanced Filter", "Filter the List, in-place", and "Unique Records Only".

TO RETURN ALL RECORDS you choose "Show All".

TO TRANSFER A CLEAN LIST you choose "Copy to Another Location", "Unique Records Only", and insert a cell address in the "Copy to" box.

Another planet

Email from Stephen Kennedy. Subject: Split identity?

I'm a subscriber to PCW so I often see your name in print. I also read NMEweeks and seeing your name always makes me wonder : you're not the same Stephen Wells (SWells) who writes for NME are you? :-) Please put me out of my misery...

To S.K. from S.W. Subject: Doppelgängers In a word, no. But they are both common names. What is NME? New Microsoft Exchange? Nice Mothers of Ecuador?

To S.W. from S.K. Subject: Identities *NME is New Musical Express —what planet have you beamed in from? ;-)*

The logical response was the one word, Uranus. But I kept schtum, believing in turning the other cheek.

Putting it on the map

I'm going to make a prediction. At the time of writing, there are seven Hands On columns in the Applications group. I have no inside knowledge but I would bet in less than a year there will be one for mapping.

Both of the leading spreadsheets, Excel 7 for Windows 95 and Lotus 1-2-3 Release 5.01 for SmartSuite 96, include mapping features in their extensive packages. That's a logical marriage. To navigators of the sea or air, a map is called a chart. And charts have long been a way of graphically illustrating the tabular data in a spreadsheet.

In its simplest form, you might have a text list of the names of countries of Europe in one column, with the numerical values of the populations of each in the adjacent column. It's logical that a traditional atlas map could be drawn from this with colours used as a key, say red for countries of 50 - 55 million people, blue for 55-60 million, and so on.

Immediately, your mind will race ahead to many other possibilities. The map itself is a constant graphic. You might zoom in and out, but the shape of a continent, a country or a county must always remain the same. And yet there are so many things we can communicate with a map.

A travel agent could show her clients the routes of different holiday packages. An advertising agent could show his clients which areas of a country have the biggest concentrations of particular target markets. A commercial radio station could illustrate its strongest reception area. A fast-food franchise could pinpoint its outlets on one map and on an overlay show the catchment area of each. A hospital authority could superimpose its defined service region over a map of actual or projected traffic accident blackspots and environmentally hazardous areas.

The fact is, a map can be just as important a tool for data analysis as a financial statement is. And it can be used in so many areas of endeavour. It has been estimated that almost 90% of business data contains reference to a location. That's what business growth is all about. One corner shop might provide six jobs and serve a village. A chain of shops might employ 6,000 and serve a country.

It doesn't have to be a huge company to do business over a wide area. A group of local newspapers could depict circulation trends and show where their concentrations of readership are. To project new subscription sales, they could have an overlay using demographic information about income, food sales and travel expenditures.

Mapped data not only allows you to visualise data in a geographic context, but to correlate the data threads that unify different regions.

There are two reasons why I think it will become an important application in its own right. One is that there is so much information which is affected by a geographic context. The other is that there is a huge potential for a wide variety of software publishers. Route information, demographic data, rates of employment, crime statistics and heritage sites are only some of the innumerable databases which could be supplied for map users.

Then there's the use of satellite imagery to show weather patterns or air pollution concentrations. And some vehicle navigation systems include a portable PC with a CD drive.

Until that new column appears, you can be sure your humble correspondent will be keeping an eye on this application for you and reporting developments.

PCW Contacts

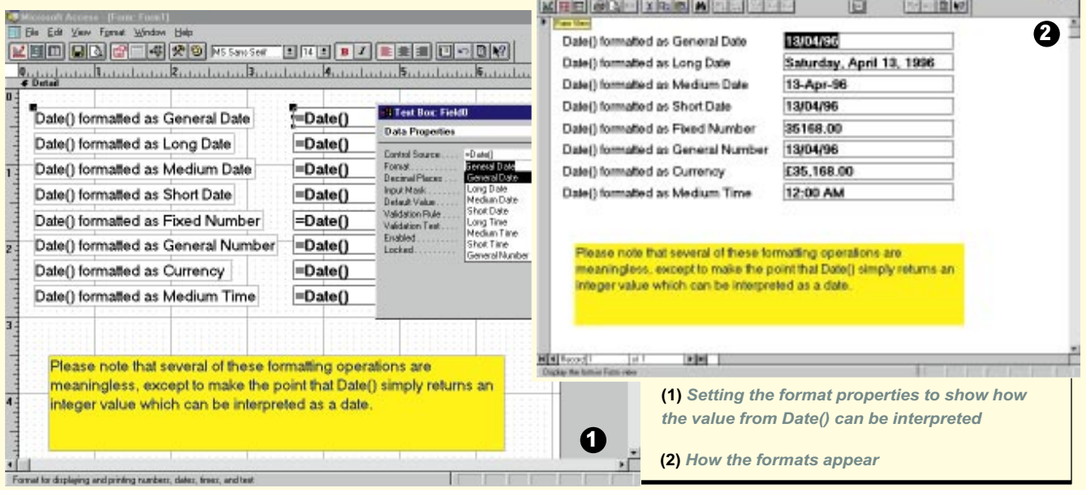
Stephen Wells welcomes comments on spreadsheets, and solutions to be shared, via PCW Editorial at the usual address or **Stephen_Wells@msn.com**. Files can be attached if you're on MSN.

Do you have problems with **dates?**

Mark Whitehorn **can't help you with your love life, but date/time types are another matter.**

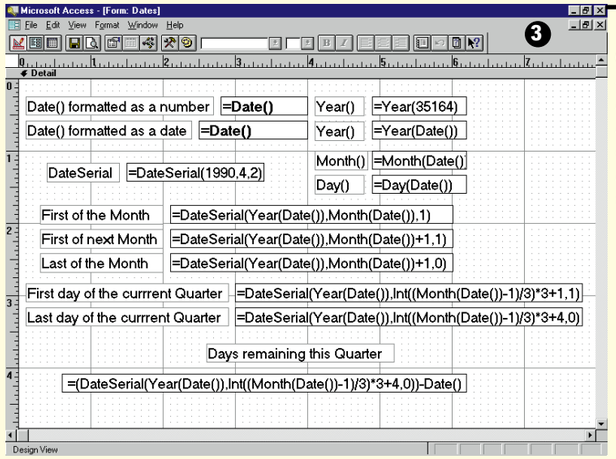
I have received several questions about handling dates in Access, particularly about ways in which specific dates (like the first day of the quarter) can be found. The following includes some elegant examples that I culled from the FAQs on the Microsoft Web site.

The Date/Time data type in Access is stored as a double-precision, floating-point number. The integer part represents the date and the decimal part represents the time. Clearly, we are only concerned with the integer part during this discussion.

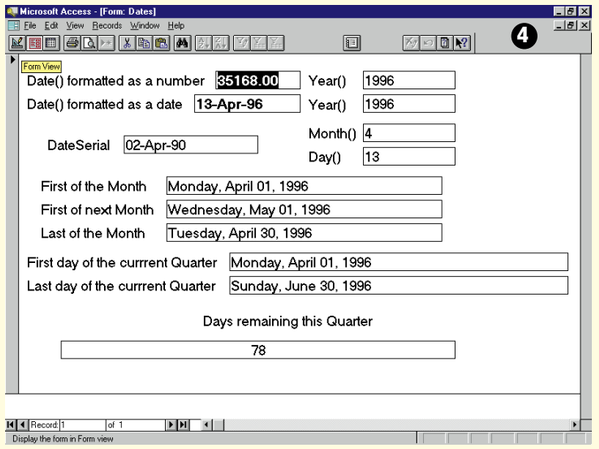


(1) *Setting the format properties to show how the value from Date() can be interpreted*

(2) *How the formats appear*



(3) *The full set of date manipulations described in the text...*



(4) *and how they appear, at least how they did appear on the 13th April*

Access includes several useful functions for date manipulation. For example, Date() returns the current date (as a number of course). This can be formatted to appear in a variety of ways on-screen (say, in a form) by choosing the appropriate format from the properties box *(see Figs 1 and 2)*.

Year() Month() and Day() are three functions which will extract the relevant part from any date. Without wishing to over-stress the point, this means that these functions will extract that information from a number since dates are stored as numbers. Clearly, these functions can be given an actual number (such as 31234), or they can be given Date() which in turn will provide them with "today's" number.

DateSerial() can be used to manipulate the day, month, and year components of a date. It takes three arguments and returns a serial version of the date. Thus:

```
DateSerial(1990,4,2)
```

returns

```
02/04/90
```

This can be presented on screen in different ways by playing with the format.

I realise that so far this list of functions and their abilities must sound a little tedious, not to say boring. However, given a working knowledge of these five functions, you can combine them in such ways as heaven's wonders to perform.

For example, to find the first day of the current month, you can use:

```
=DateSerial(Year(Date()),
 Month(Date()), 1)
```

The first of the next month:

```
=DateSerial(Year(Date()),
 Month(Date()) + 1, 1)
```

The last day of the current month (a clever one this!):

Fig 5

EMPLOYEES

Employee No	First Name	Last Name	Date Of Birth	Date Employed
1	Bilda	Groves	12/04/56	1/5/89
2	John	Greeves	21/03/67	1/1/90
3	Sally	Smith	1/5/67	1/4/92

Fig 6

SALES

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harison	£ 235.67
2	1	Johnson	Chair	Harrison	£ 453.78
3	2	Smith	Stool	Ford	£ 82.78
4	2	Jones	Suite	Harisonn	£3421.00
5	3	Smith	Sofa	Harrison	£ 235.67
6	1	Simpson	Sofa	Harrison	£ 235.67
7	1	Jones	Bed	Ford	£ 453.00

Fig 7

SALES2

Sale No	Employee No	Customer	Item	Supplier	Amount
3	2	Smith	Stool	Ford	£ 82.78
5	3	Smith	Sofa	Harrison	£ 235.67
213	3	Williams	Suite	Harisonn	£3421.00
216	2	McGreggor	Bed	Ford	£ 453.00
217	1	Williams	Sofa	Harrison	£ 235.67
218	3	Aitken	Sofa	Harison	£ 235.67
225	2	Aitken	Chair	Harrison	£ 453.78

```
=DateSerial(Year(Date()),
 Month(Date()) + 1, 0)
```

The first day of the current quarter:

```
=DateSerial(Year(Date()),
 Int((Month(Date()) - 1) / 3) *
 3 + 1, 1)
```

The last day of the current quarter:

```
=DateSerial(Year(Date()),
 Int((Month(Date()) - 1) / 3) *
 3 + 4, 0)
```

Number of days remaining in this quarter:

```
=(DateSerial(Year(Date()),Int((Month
Date())-1)/3)*3+4,0))-Date()
```

and so on *(see Figs 3 and 4, page 293)*.

The possibilities are almost endless…

Gang screens

I don't want anyone to think I am obsessed with gang screens, but…

Windows 95

Right click on the DESKTOP, select NEW, FOLDER and name it "and now, the moment you've all been waiting for". Press Enter, right click on the folder and rename it to "we proudly present for your viewing pleasure". Press Enter again, right click and rename the folder once more to "The Microsoft Windows 95 Product Team!", now open the folder. (Just type in the words, not the inverted commas.)

Excel 95

First open a new Excel workbook and go to row 95. Select the entire row, then press tab once to move the cursor into column B (the entire row should remain selected). Pop down Help, About Excel, hold down CTRL and SHIFT together and select the Technical Support button. A new window will open. Walk forwards slightly, turn around 180 degrees, walk up to the wall and type "excelkfa". A secret door will open and I leave it up to you to navigate across the top of the wall to the next room.

What has this to do with databases? Er, the gang screens present data about the people who wrote the products, so the gang screens themselves must be databases. Sounds reasonable to me. *(But not to me — Ed.)*

SQL tutorial

Last month I started looking at SQL and began with the operators that it uses. We covered Restrict (aka Select), Union, Difference and Intersection. That only leaves two major ones, Product and Projection.

Once more, the sample tables are presented here *(Figs 5, 6 & 7)*.

Product

The product of two tables is a third which contains all the records in the first one, added to each of the records in the second. Thus, if the first table has 3 records and the second has 7, the product will have 21 records. The product of EMPLOYEES times SALES is shown in *Fig 8*.

This product operation has been applied quite correctly; however, the astute reader will note that the table in *Fig 8* contains seven rows which appear to be "meaningful" and 14 which are not. Note that we are dealing with a raw operator which takes no account of the values in fields, nor of any meaning that those values may imply or indicate.

In practice, the product operation may need to be modified by further operations in order to yield a meaningful answer.

The even more astute reader will have noticed that *Fig 8* contains two fields with identical field names. This state of affairs is not permitted in a table, and in practice an RDBMS will have to cope with this in some way, perhaps by renaming one of the fields.

However, as has been said before, these relational operators are the "primitives" from which more complex systems are constructed and it's usually the job of these higher-level constructs to cope with problems like this.

Projection

Projection selects one or more fields from a table and generates a new table which contains all the records, but only the selected fields. Thus, if we project EMPLOYEES on [FirstName] and [LastName] the result is as *Fig 9*.

This seems straightforward, but if we project SALES on [EmployeeNo] and [Customer] the result is as *Fig 10*.

Despite the fact that [SALES] has seven records, the answer table has only six. This is because one of them:

```
1          Simpson
```

would be duplicated in the answer table, and tables cannot contain duplicated records.

If we projected SALES on [SaleNo], [EmployeeNo] and [Customer] then the answer table *(Fig 11)* will contain seven records because in the original table the values in [SalesNo] are unique.

Fig 8

Employee No	First Name	Last Name	Date Of Birth	Date Employed	Sale No	Employee No	Customer	Item	Supplier	Amount
1	Bilda	Groves	12/04/56	1/5/89	1	1	Simpson	Sofa	Harison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	2	1	Johnson	Chair	Harrison	£ 453.78
1	Bilda	Groves	12/04/56	1/5/89	3	2	Smith	Stool	Ford	£ 82.78
1	Bilda	Groves	12/04/56	1/5/89	4	2	Jones	Suite	Harisonn	£3421.00
1	Bilda	Groves	12/04/56	1/5/89	5	3	Smith	Sofa	Harrison	£235.67
1	Bilda	Groves	12/04/56	1/5/89	6	1	Simpson	Sofa	Harrison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	7	1	Jones	Bed	Ford	£ 453.00
2	John	Greeves	21/03/67	1/1/90	1	1	Simpson	Sofa	Harison	£ 235.67
2	John	Greeves	21/03/67	1/1/90	2	1	Johnson	Chair	Harrison	£ 453.78
2	John	Greeves	21/03/67	1/1/90	3	2	Smith	Stool	Ford	£ 82.78
2	John	Greeves	21/03/67	1/1/90	4	2	Jones	Suite	Harisonn	£3421.00
2	John	Greeves	21/03/67	1/1/90	5	3	Smith	Sofa	Harrison	£235.67
2	John	Greeves	21/03/67	1/1/90	6	1	Simpson	Sofa	Harrison	£ 235.67
2	John	Greeves	21/03/67	1/1/90	7	1	Jones	Bed	Ford	£ 453.00
3	Sally	Smith	1/5/67	1/4/92	1	1	Simpson	Sofa	Harison	£ 235.67
3	Sally	Smith	1/5/67	1/4/92	2	1	Johnson	Chair	Harrison	£ 453.78
3	Sally	Smith	1/5/67	1/4/92	3	2	Smith	Stool	Ford	£ 82.78
3	Sally	Smith	1/5/67	1/4/92	4	2	Jones	Suite	Harisonn	£3421.00
3	Sally	Smith	1/5/67	1/4/92	5	3	Smith	Sofa	Harrison	£235.67
3	Sally	Smith	1/5/67	1/4/92	6	1	Simpson	Sofa	Harrison	£ 235.67
3	Sally	Smith	1/5/67	1/4/92	7	1	Jones	Bed	Ford	£ 453.00

Fig 9

ANSWER

FirstName	LastName
Bilda	Groves
John	Greeves
Sally	Smith

Fig 10

SALES

Employee No	Customer
1	Johnson
1	Jones
1	Simpson
2	Jones
2	Smith
3	Smith

Fig 11

ANSWER

SaleNo	Employee No	Customer
1	1	Simpson
2	1	Johnson
3	2	Smith
4	2	Jones
5	3	Smith
6	1	Simpson
7	1	Jones

Summary

The following is not rigorous, nor is it detailed, but if you have read and understood the previous section it should provide a quick reference to remind you what the operators are and what they do.

Two of the operators (**Restriction** and **Projection**) operate on single tables.

- **Restriction** (aka Select) extracts records.
- **Projection** extracts fields.

The remaining four operators (**Union, Difference, Intersection** and **Product**) all perform operations on two tables.

- **Union** adds the records from two tables together.
- **Difference** subtracts the records in one table from those in another.
- **Intersection** locates the records that are common to two tables.
- **Product** multiplies the records in the two tables together.

Assuming that each operation is performed on a pair of tables with 20 and 10 records respectively, the number of records in the answer table will have:

- **Union** — between 20 and 30
- **Difference** — between 20 and 10 (assuming that we subtract the table with 10 records from that with 20)
- **Intersection** — between 0 and 10
- **Product** — 200

Join

Join is often used as a relational operator and it can be built up from the simpler ones described earlier. Think of it as a mixture of the product and restriction operators, sometimes with an added dash of projection.

Suppose that you want to examine the sales that have been made by your employees. In order to do this, you need information from both the EMPLOYEES and SALES tables. (In fact, the table SALES2 contains information about more sales, and if we wanted to include this information we would first use the union operator. However, for the sake of brevity, we will assume that we are only interested in the sales recorded in SALES.)

Fig 12

Employee No	First Name	Last Name	Date Of Birth	Date Employed	Sale No	Employee No	Customer	Item	Supplier	Amount
1	Bilda	Groves	12/04/56	1/5/89	1	1	Simpson	Sofa	Harison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	2	1	Johnson	Chair	Harrison	£ 453.78
1	Bilda	Groves	12/04/56	1/5/89	6	1	Simpson	Sofa	Harrison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	7	1	Jones	Bed	Ford	£ 453.00
2	John	Greeves	21/03/67	1/1/90	3	2	Smith	Stool	Ford	£ 82.78
2	John	Greeves	21/03/67	1/1/90	4	2	Jones	Suite	Harisonn	£3421.00
3	Sally	Smith	1/5/67	1/4/92	5	3	Smith	Sofa	Harrison	£235.67

Fig 13

Employee No	First Name	Last Name	Date Of Birth	Date Employed	Sale No	Customer	Item	Supplier	Amount
1	Bilda	Groves	12/04/56	1/5/89	1	Simpson	Sofa	Harison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	2	Johnson	Chair	Harrison	£ 453.78
1	Bilda	Groves	12/04/56	1/5/89	6	Simpson	Sofa	Harrison	£ 235.67
1	Bilda	Groves	12/04/56	1/5/89	7	Jones	Bed	Ford	£ 453.00
2	John	Greeves	21/03/67	1/1/90	3	Smith	Stool	Ford	£ 82.78
2	John	Greeves	21/03/67	1/1/90	4	Jones	Suite	Harisonn	£3421.00
3	Sally	Smith	1/5/67	1/4/92	5	Smith	Sofa	Harrison	£235.67

Go-slow on speed

I have said that I'd look at the speed of the different SQL solutions to the long-running meter problem. However, last month I published another solution and asked for comments on both its match to the relational model and its speed potential. There is a delay between my writing this column and you reading it, such that as I write this month's you still haven't read last month's. So, I'll delay the speed issue one more month, and then let you know what I found.

The first job is to perform a projection on these tables. Next we need to perform a selection which removes the records where EMPLOYEES.EmployeeNo is not equal to SALES.EmployeeNo. (Finally, we might optionally remove some fields from the answer table.)

We might express a join in this form:

```
EMPLOYEES JOIN (EMPLOYEES.EmployeeNo
        = SALES.EmployeeNo) SALES
```

and the result would be as shown in *Fig 12*.

To be a little more accurate, the table in *Fig 12* is the result of what is known as an **equijoin**. The table in *Fig 13* is the result of a **natural** join.

The simplistic difference is that one of the fields used in the join has been removed from the answer table.

There is slightly more to this than meets the eye, however. Joins come in several flavours and you will hear people talking about natural, equi, theta, outer and semi-joins.

While it is true that all of these joins differ in usefulness, they nevertheless all find their way into discussions about SQL. So, we'll have a look at them in more detail next month. ■

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on **m.whitehorn@dundee.ac.uk**

Sorry, it was an **accident**

Terence Green's pic of Netscape and Web Explorer side by side in blissful harmony has prompted readers to ask how it was done. Well, it was like this...

I might as well start with another darned apology. It was a mistake to include the screenshot with a snap of Netscape 2.0 and Web Explorer running side by side (*PCW* March). Ever since, I've received emails asking me how I did it. It was an accident, okay? I discovered this not long after my original copy had disappeared into the editorial department where they turn my rough-hewn phrases into finely polished prose. Ensuing versions of the Netscape 2.0 beta crashed and burned when faced with running under OS/2 Warp.

Several people sent emails detailing their preferred methods and no doubt many of them worked just fine but the quick answer at the time, an update to the virtual DOS TCP/IP protocol stack, was hidden on an IBM FTP server in Colorado. Along with some other stuff I'll detail below I've uploaded the fix, IC11173.ZIP, to the *PCW* editorial team which I hope will manage to squeeze it onto the *PCW* cover-mounted CD-ROM disc. If any of this stuff doesn't make it onto the CD, you can find it online.

As you will have noticed if you looked at the May issue cover CD, some OS/2 information has already made its way onto the CD. This is a direct consequence of a reader querying whether Just Add Warp (JAOW), mentioned in the March column, might be included as it's normally a 3Mb-plus download. Wheels ground into motion and *voilà*! Unfortunately, there seems to have been a slight hiccup in its passage as the cover CD highlights the Interactive Warp Guide — an interesting demo but hardly the fact-packed JAOW we were expecting.

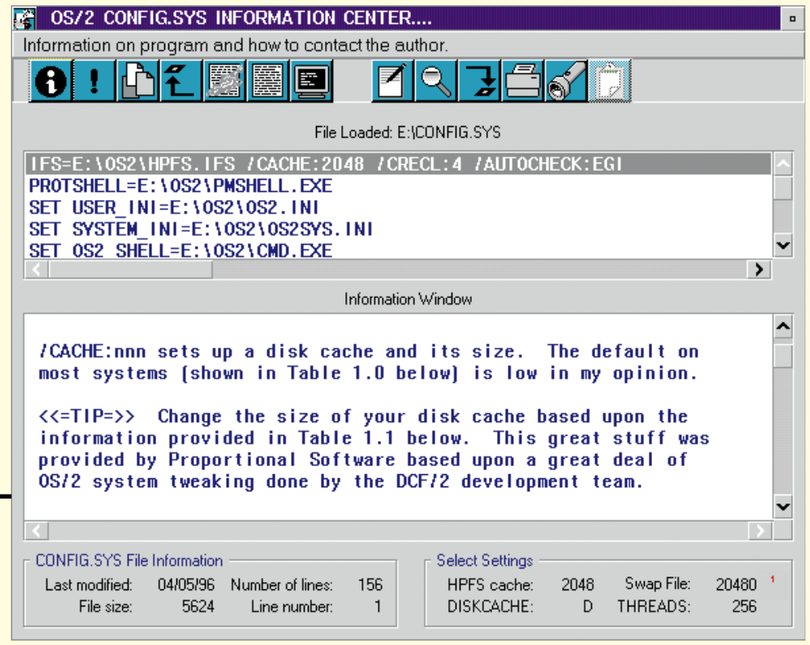


Fig 1 *The OS/2 CONFIG.SYS Information Centre is one of the many useful OS/2 Warp tuning utilities that are available as freeware or shareware*

Just add a bit of Warp

A little investigation revealed a slight discrepancy between the 3Mb Just Add Warp files, downloadable from the Internet, and those on the *PCW* cover CD. The missing bits are mostly the interesting ones, namely OS/2 Warp Frequently Asked Questions, Stupid OS/2 Tricks, OS/2 Warp Connect Questions and Answers, and the IBM Worldwide Electronic Resource Guide. No doubt it's a copyright thing. Publishers are well known for the care they take to establish electronic re-publishing rights. I'll check the situation and upload the missing bits if possible.

Accentuating the positive, the good news is that IBM hasn't excised the OS/2 Hardware Compatibility List information in this shrunken version of Just Add Warp. If you're at all interested in running Warp you really should try and use hardware that's on this list, the latest version of which may be found at http://www.austin.ibm.com/pspinfo/os2hw.html, because an OS/2 system running on solid hardware is miles more fun than one running on marginal kit.

Readers often ask which is the best system on which to run OS/2 and the answer is: one that supports it. So if you're thinking of buying a new machine for OS/2 and you're not particularly keen on all this propellor-head stuff, find a vendor who has an OS/2 OEM agreement with IBM. In the UK these include Adams Technology, Atomstyle, Aztec, CTX, Dell, Electrowide, Elonex, Escom, ICL, Osborne, Racal, and Viglen.

That darned Web Explorer again

Some OS/2 Warp utilities I've uploaded deserve longer descriptions. The Web Explorer 1.03b update is a useful fix but the information in the Readme is even more helpful. If you've been caught, as I have, by the exploding swapper file while using Web Explorer then try this: open the Configure pull-down menu, choose Loading and ensure the second box (Display images while loading) is not ticked.

The OS/2 Config.sys Information Centre (CFGINFO4.ZIP) is one of those essential utilities for users who like tweaking their systems and it's also a great introduction to the CONFIG.SYS file (see *Fig 1*). It loads your CONFIG.SYS into the top window and a detailed explanation of the CONFIG.SYS, complete with hints and tips, in the lower window. You can step through your configuration files and make sure they're as they should be for your system.

WorkPlace Shell Tools (WPTOOL18.ZIP) are for the slightly more advanced user. This set will work its way through your OS2.INI and OS2SYS.INI files tracing all the redundant links and offering to remove them. The reason you might want to use such a tool is that the WorkPlace Shell remembers everything you ever did with it, so that network drive you briefly visited a year ago and all those programs you installed and then removed, still have references to them in the INI files. There's a reason for this behaviour: it's they way OS/2 keeps track of WorkPlace Shell objects that puts it a cut above operating systems that rely on absolute file paths. As a result, the WPS can keep track of stuff when you move it around.

But one of the niggling omissions in Warp is a simple way of cleaning up redundant links. The WPS only knows that I visited that file server directory; it doesn't

News Focus: OpenDoc

If the advance information is on the ball by the time you read this, IBM will have started shipping beta versions of OpenDoc for Windows NT and Windows 95. This is good news for developers who are intending to develop cross-platform applications. Microsoft Windows covers a lot of desktops and some servers but it doesn't account for all the computers out there.

OpenDoc is a cross-platform development tool for the development of small, mostly specialised, object-orientated applications. It is based on a system object model (SOM) which enables OpenDoc applications (sometimes called parts) running on multiple platforms to communicate with one another. Because SOM is language-independent it will be possible to use any programming language to code OpenDoc parts.

By coincidence, the Internet has been picking up a lot of coverage lately, in particular because of a cross-platform language called Java. This raises the possibility that OpenDoc could be the integrating tool for applications composed of Java applets.

IBM has licensed Java and has it ported to OS/2 and AIX already, and is preparing a Windows 3.1 port, too. They've also noticed the neat match between OpenDoc and Java. They recently demonstrated an Internet application in which Java applets were linked into an OpenDoc application running on OS/2, Windows NT and AIX.

OpenDoc for OS/2 and OpenDoc for Apple Macintosh are ready now. OpenDoc for AIX is also in beta. OpenDoc support for the AS/400 (OS/400) and IBM mainframes (MVS) is coming.

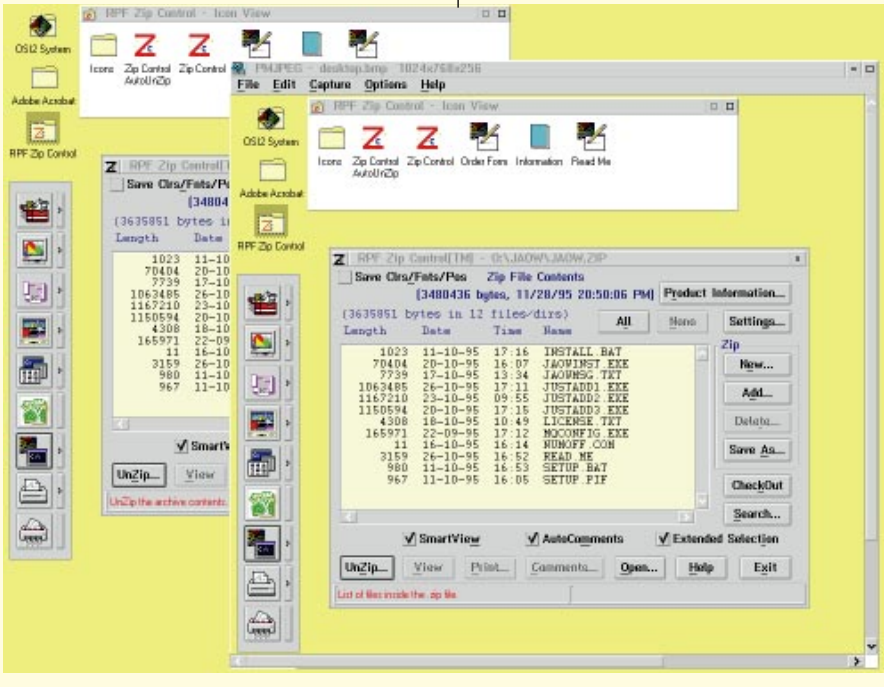
For more OpenDoc information, try the Club OpenDoc home page at http://www.software.ibm.com/club-opendoc

know that I'm not going back there again so it keeps the reference. And it doesn't include an uninstall function that removes program references when we delete programs, which is where WorkPlace Shell Tools comes in. Just remember to use it with care, to have a backup ready and to make an archive if possible before starting to prune your INI files.

I've been playing with the latest IBM AntiVirus tool. It's nice and it works very well, but it costs money. You may suspect you have a virus but just want to run a quick scan for peace of mind. To this end, I've added the McAfee scanner. It's shareware, and as with all shareware should be registered if you plan to use it regularly. But before you decide on the IBM or McAfee anti-virus products consider Dr Solly's Anti-Virus for OS/2 instead. In a list of three, I'd put Dr Solly's product first.

I'm often asked how one contacts IBM for problem support via email. There *are* email addresses for support but they like to see a structured problem report. The Problem Report Generator (OS2PROB.ZIP) is what you need. It helps you to create a detailed problem report and stores it as a file which you can email to IBM.

Fig 2 *PMJPEG seen capturing an OS/2 screen showing RPF Zip Control being used to unpack the Just Add Warp file downloaded from the Internet*



Shareware/Freeware utilities

I've sent the editor a bunch of useful OS/2 utilities for our free, cover-mounted CD-ROM. Most of these are in response to reader emails. **BootOS2 (BOOTOS2.ZIP)** is a useful tool for creating bootable OS/2 diskettes and partitions. **OS/2 PM Commander (EFCOMM.ZIP)** is a neat Norton Commander file manager clone. **RPF Zip Control (ZIPCT228.ZIP)** is a front-end for OS/2 file ZIP file compression/decompression utilities, and **ZOC 2.13 (ZOC213.ZIP)** is a well-regarded terminal application for OS/2. I like the ZOC licence which states, "ZOC must not be used in an army environment or for purposes that are related to military or arms production".

The illustration of Zip Control (*Fig 2*) shows an example of **PMJPEG (PMJPG173.ZIP)** in action, capturing a screenshot in OS/2. PMJPEG is just one of a gazillion screen capture and image manipulation utilities for OS/2. You can find tons of OS/2 shareware and freeware on CompuServe (GO OS2SHARE), and on the two Internet sites mentioned in a previous column; LEO in Germany and Hobbes.

Another site worth looking into is **OS/2 "Must-Have" Utilities and FTP Links** at http://www.os2.hammer.org/uhtml/Warp/h3/h3index.html, as they seem to keep their site up to date. If you would like to be on top of OS/2 developments but don't fancy wading through the comp.os.os2.* newsgroups, you might want to subscribe to comp.os.os2.announce only as this is a moderated newsgroup.

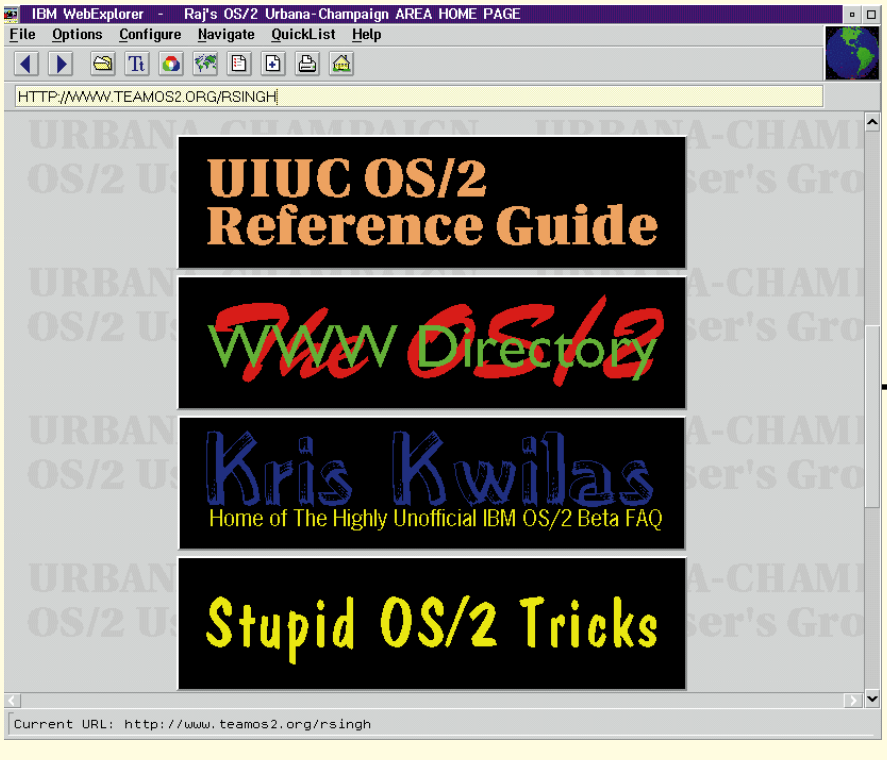


Fig 3 *Raj Singh's home page is an excellent starting point for unofficial OS/2 information on the Internet*

PCW Contacts

Terence Green can be contacted either by post c/o *PCW* or by email to **tgreen@cix.compulink.co.uk**.

Back in **sequence**

Descriptive Number Sequences, part two, presented by **Mike Mudge.**

Continuing the study of Numbers Count, June 1996: Recall the definition, due to Jonathan Ayres, of Leeds: $ds_n(m)$ where n is the index of the sequence and m the original number. Thus:

$ds_1(0) = 10$

because the original number consists of 1 zero; whilst

$ds_2(0) = 1011$

because $ds_1(0)$ consists of 1 zero and 1 one.

Problem A. Is there a way of deciding if a given initial number, x say, leads to a self-descriptive number (such as 1031223314) without calculating the whole descriptive sequence?

Empirical evidence suggests that as x increases, the likelihood of a sequence becoming self-descriptive decreases. Why is this?

Problem B. Is there any function which relates the chances of a number becoming self-descriptive with the magnitude of the number?

COMPLETELY DESCRIPTIVE SEQUENCES, Ds(n)

These are similar to descriptive sequences, but the next number in the sequence refers to all the digits zero to nine i.e. it does not omit the reference to non-occurring digits.

$Ds_1(0) = 10010203040506070809,$
$Ds_2(0) = 10021121314151617181 9$

This process converges to the amicable descriptive pair:

$Ds_6(0) = 10714213141516171819,$
$Ds_7(0) = 10812213241516271819$

Problem C. Do all numbers n lead to the above amicable descriptive pair?

WHAT HAPPENS IN DIFFERENT NUMBER BASES?

In binary, for example,

$ds_1(0) = 10, ds_2(0) = 1011$ whilst
$ds_3(0) = 10111$

We have 11 ones since 3 is represented in binary as 11; subsequently

$ds_9(0) = ds_{10}(0) = ... = 1101001$

a self-descriptive number in binary, having three zeros and four ones.

Example: in base 6 there is an amicable descriptive pair consisting of

103142132415 & 104122232415

Problem D. Are there any number bases with period four or larger amicable descriptive sequences?

DESCRIPTIVE SEQUENCES OF ORDER GREATER THAN ONE

Here the digits are regarded in groups of order n which may be either CONSECUTIVE...TYPE I, or GROUPED..TYPE II?

In type 1 the number zero generates the following:

$dsc^2{}_1(0) = 0100$

which is then split into 01, 10 & 00

$dsc^2{}_2(0) = 010001010110$ and $dsc^2{}_3(0) = 0200040104100111 ...$

whilst in type II the number zero generates the following:

$dsg^2{}_1(0) = 0100$

(because order two uses two digits so 0 goes to 00 and 1 goes to 01)

$dsg^2{}_2(0) = 01000101$

i.e. one zero and one one.

$dsg^2{}_3(0) = 01000301$

i.e. one zero and three ones etc.

It is found that $dsg^2{}_{989}(0)$ and its amicable descriptive partner are each 395 digits long; whilst $dsc^2{}_{41}(0)$ having 395 digits also is part of an amicable descriptive pair.

Problem E. Analyse completely the behaviour of type I & type II descriptive sequences of order two, consider the extension to higher orders. (Remember the order is the size of the subsets of digits being counted.)

TWO-DIMENSIONAL DESCRIPTIVE SEQUENCES, $^2DS(n)$

Descriptive sequences can be generalised from one-dimensional "lines" of numbers to two-dimensional "planes" of numbers. One way to do this consistently is to define the columns, m, of $^2DS_{n+1}(x)$ to be equal to ds_1(row m) as is illustrated by the following example:

$^2DS_1(0) = 1_0$ (because $ds_1(0) = 10$) thus
$^2DS_2(0) = 11_{10}$ (because $ds_1(1) = 11$ and $ds_1(0) = 10$) repeated iteration leads to:

$^2DS_5(0) =$

4	1	2	1
1	0	1	1
3	1		
1	2		

Jonathan Ayres has failed to discover any two-dimensional self-descriptive or amicable descriptive sequences, having investigated up to $^2DS_{1000}(0)$ and beyond. However, he observes that $^2DS(\ )$ must lead to a recurrent sequence because it is fixed in size. The biggest $^2DS(\ )$ gets in size is 19 rows by 19 columns and since each position contains a digit 0..9 then there are 10^{361} possible values for $^2DS(\ )$, but half the possible positions on average are spaces and half the remaining numbers are fixed because they are the digit number, so maximum period is about 10^{81}.

Problem F. Investigate two-dimensional descriptive sequences with a view to finding self-descriptive or amicable descriptive patterns.

Any investigations of the above problems may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, Carmarthenshire SA33 4AQ, tel 01994 231121, to arrive by 1st October 1996. All material received will be judged using suitable subjective criteria and a prize will be awarded by Mike Mudge, to the "best" entry arriving by the closing date.

Feedback: November 1995 — Squambling

This proved to be a remarkably popular topic. Why? Gareth Suggett established the answer to the original *Sunday Times* problem as 46, for which one iteration of the squambling function gives 232, and a second gives 47. He found all of George Sassoon's loops and lists a 105-step loop, 40372656... whose smallest entry is 5 and largest entry is 43055027. He found modsquam less interesting, being monotonic decreasing and ending (always) with 1. Nigel Hodges proved that squambling sequences and their various generalisations cannot diverge. However, this month the prize is awarded to G.D. Williams of 18 Mawnog Fach, Bala, Gwynedd LL23 7YY, who displays an awareness of the problems of integer overflow even when programming in Turbo C++. Mr Williams has noted the basic difference in the behaviour (as he perceives it) between sqm( ) & modsqm( ).

There is scope for further investigation of this function, in particular when the number base is different from ten.

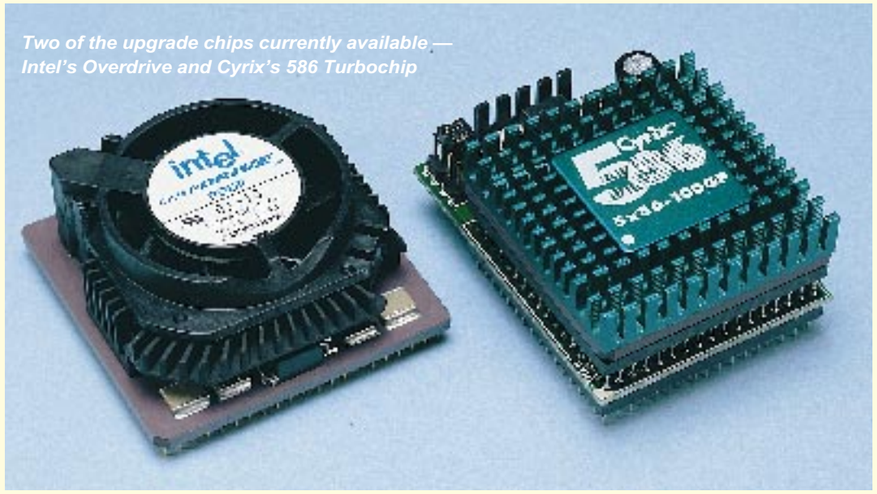
PCW *Contributions Welcome*

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future *Numbers Count* articles.

Processor **push-ups**

Give that lazy old PC a kick up the socket with a processor upgrade. Roger Gann tells you how to fortify the 486s.

PCW Chip Photography by Graham *Pearson*



Two of the upgrade chips currently available — Intel's Overdrive and Cyrix's 586 Turbochip

My steely gaze alights this month on processor upgrades. As sure as night follows day, the PC you buy today will inevitably appear to run slowly tomorrow, weighed down by the ever-increasing burden of running the latest 32-bit software and operating systems. Luckily, for the vast majority of PC owners it's possible to revitalise their sluggish PCs by upgrading their existing processor and replacing it with a more powerful one. Luckier still, this is a relatively simple task.

This month I'll be looking at upgrading your CPU and divulging the odd tip or two. I'll concentrate on upgrading 486s as not only are they the most plentiful but they also have the most pressing need of upgrading. Although the 486 is now technically obsolete, the world is awash with them: according to Intel, there are already 50 million upgradable 486s out there. This is no bad thing from an upgrading point of view, because the 486 family was designed from the outset to be upgradable.

Sockets

The key to processor upgrading is that most, if not all, 486 processors are socketed. This means that it's a simple task to extract the old processor from its socket and plug in a replacement. Even those handful of 486SX processors that were soldered down were, typically, additionally provided with an empty upgrade socket.

The original Pin Grid Array (PGA) socket held the CPU in by friction, which meant that the chip didn't just lift out: the unit and its 168 pins had to be levered out. Normally, the pin holes in a traditional processor socket tapered slightly to ensure a good electrical contact; the chips were effectively tightly held in by friction, hence their reluctance to be removed. Luckily, every Overdrive kit comes with a high-tech crowbar (chip-puller) to prise old 486s out of old PGA sockets.

To make CPU upgrading a lot easier, even though it's a task you'll probably only ever do once or twice, Intel designed the Zero Insertion Force (ZIF) CPU socket. A ZIF socket is a little larger than a normal PGA socket and uses a lever, or handle, to clamp the chip pins tightly. To remove the chip, you unclip the lever and lift it. This unclamps the CPU which then lifts out very easily — with zero force, in fact. Most 486s and all DX4s and Pentiums feature ZIF sockets.

There are several sorts of ZIF socket. The type of socket will determine what processor upgrade options are available, so it pays to take a peek under the bonnet to see just what sort of a socket you've got.

There are four types of ZIF socket installed in 486-based PCs:

Socket 1 A 169-pin, blue, ZIF socket; this can only accept 486 Overdrive processors.

Socket 2 A 238-pin, blue, ZIF socket; this can accept both 486 and Pentium Overdrive processors.

Socket 3 A white, 237-pin, ZIF socket; this is essentially the same as Socket 2 but can take the low voltage 3.3v DX4 and Pentium Overdrive. The "missing" pin is used to correctly orientate the square chip.

Socket 6 A 235-pin socket for DX4 processors.

Pentium-based machines have even larger ZIF sockets:

Socket 4 A white, 273-pin, ZIF socket; this is used for Pentium 60 and Pentium 66 processors.

Socket 5 A white, 320-pin, ZIF socket; this is used for Pentium 75 processors and above.

Socket 7 A white 321-pin ZIF socket; the current standard socket for the entire Pentium range. It can take future Pentium upgrade processors.

Socket 8 The largest ZIF socket of all, for the Pentium Pro.

The upgrade choice

So given the right socket, the range of upgrade processors you can fit is quite wide. If you've got a 486SX/25 with a Socket 3 you'll be able to choose between four Overdrives: the 486SX2, which is a speed-doubled version of the SX; the 486DX2, which is a speed-doubled CPU with maths co-processor; the DX4, which is a speed-trebled processor with maths co-processor; or, a 63MHz Pentium Overdrive.

Note that Intel is in the process of phasing out the slower Overdrives and you'll have to move fast to snap up any of the 486SX2 or DX2 models before the summer. That leaves the 75MHz and 100MHz DX4 and the 63MHz and 84MHz Pentium Overdrives. Their prices start at £112 for the entry-level DX4. The 100MHz DX4 and the 63MHz Pentium Overdrive are £145 each and the top-end Pentium Overdrive is £209, but street prices are much lower.

And what about Pentium owners? Although it's always been possible to upgrade Pentium 75s and above, simply by replacing them with faster, "loose", OEM (original equipment manufacturer) versions sold in the retail market, this luxury was denied to owners of older 60MHz and 66MHz Pentiums. This has now been rectified with the recent release of the latest clutch of Pentium Overdrives, which cater for 60, 66, 75 and 90MHz Pentiums. It costs £246 to buy a 120/133MHz Pentium Overdrive — 125MHz in the case of 75MHz upgrades (reviewed in the April issue of *PCW*).

Alternatives to Intel

But don't think it's Hobson's choice when it comes to CPU upgrades — there are alternatives to Intel. Cyrix has left the upgrade market *per se* but its processors turn up in third-party upgrade products — the new 5x86, for instance, turns up in the PowerLeap/586 (contact Future Upgrades; see *PCW Contacts* panel). This is as powerful as the Pentium Overdrive 83 but at £95 is less than half the price of its Intel rival. The catch is that the 5x86 is

How to upgrade your processor — see over page

Overdrive *vs* "loose"

You don't have to look too far to see that plenty of dealers these days are selling both ordinary and Overdrive processors. Internally, these chips are almost identical but they carry quite different price tags: an Intel 486DX2/66 Overdrive might go for £85 while just £22 will buy you a ST486DX2-66-GS CPU made by the French chip giant, SGS.

The two chips are, to all intents and purposes, identical but one is almost four times the price of the other. Surely only a fool would buy the dearer of the two? Well, when confronted with bargains like this, you have to bear in mind the reason for the price difference: you get more if you plump for the Intel.

The cheaper CPUs are invariably sourced from the OEM (original equipment manufacturer) market and so aren't meant to be sold in the retail market — they are intended to be installed by PC manufacturers and not end-users. They are supplied in bulk, with little or no packaging, no instructions and no support: when you buy one of these, you're on your own.

With the Overdrive you get full instructions, tech support, software, a three-year warranty and a money-back guarantee. You also get special versions of the chip that will allow a 3.3v Overdrive CPU to run in a 5v socket, for example.

If you know what you're doing, CPUs that are sold "loose" are a bargain. But if you're new to the processor upgrade game it's best to play safe and go down the Overdrive route.

Supercharging an Overdrive

Intel has gone to considerable lengths to make the potentially fraught matter of processor upgrading as simple as possible. It *must* be as uncomplicated as possible if it's to be a retail product, likely to be installed by a non-technical end-user.

At its simplest, all you have to do is take out the old CPU and bung in the new one. At worst, you might have to move some motherboard jumpers. The down side of this approach is that it limits your choice somewhat: if you had an old 25MHz 486SX and wanted to fit a Pentium Overdrive, you could only buy the 63MHz version because the faster, 83MHz version is meant for 33MHz motherboards. Or, if you were looking at a DX4 you'd have to fit the 75MHz version rather than the 100MHz one.

Nevertheless, most motherboards (even quite old ones) were designed to take a variety of processors and so were able to run at a variety of speeds, typically 25MHz or 33MHz. These so-called "clock speeds" are normally determined by a set of jumpers on the motherboard, so if you could adjust the clock speed from 25MHz to 33MHz you'd be able to fit the 83MHz Pentium Overdrive rather than the slower 63MHz version. Sure, it would cost you more, but you'd be getting a faster PC at the end of the day and thus it's definitely worth paying the extra £30 or so. However, setting the motherboard speed jumpers can be fiddly and you'll need the assistance of your motherboard handbook to tell you which ones to move, but the hassle is worth it in the long run.

What performance gains can you expect?

Simply fitting a more powerful processor doesn't commensurately increase the overall power of your PC — it'll have a greater impact on some tasks than others. Yes, you do get gains from upgrading your processor but nowhere near as great as you might have hoped for.

Synthetic benchmarking may reveal integer and floating-point performance improvements of as much as 100 percent as a result of such an upgrade, but the real-world improvements you can expect will be much lower: in the 20 to 30 percent range.

Other factors such as installed memory, hard disk and graphics have just as great an influence on overall performance and will dilute the apparent gains to be had from installing a processor upgrade. So if you do a lot of processor-intensive tasks, such as spreadsheeting or multimedia, then provided the price is right, a processor upgrade is worth considering as a PC's mid-life booster.

The bevelled corner of the new chip must be lined up correctly. Here, Pin 1 is marked on the motherboard

so modern, it's only suited to the more recent motherboards. Kingston Technology does a range of processor upgrades as well, the "Turbochip" range (contact Datrontech; see *PCW Contacts* panel).

Step-by-Step

UPGRADING YOUR PROCESSOR

When handling processors it's particularly important to remove any static electricity you might be carrying by earthing yourself — don't forget, you'll be handling something expensive that's easily zapped by static!

Step 1

● Power down and unplug the PC from the mains and disconnect all other leads.

Step 2

● Take the lid off the PC. It'll be held on by four or five self-tapping screws and you'll most likely need a Phillips screwdriver to undo them. Keep them in a safe place.

● Locate and identify the 486 processor. It might be a good idea to remove some or all of the expansion cards to give yourself more space.

Step 3

● Note the orientation of the printing on the old processor: it may help you orientate the new chip.

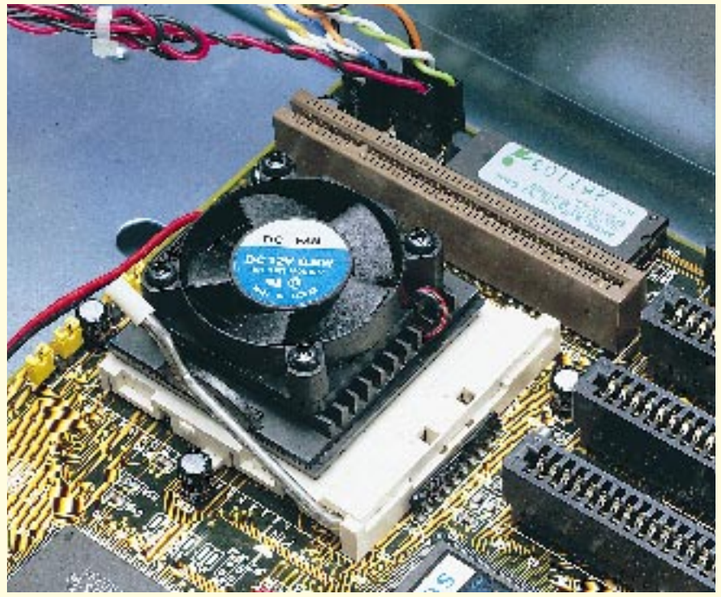
● Remove the processor. If it's in a ZIF socket, simply unclip the release lever and lift it up — you can now lift out the processor. If it's in a PGA socket, use the special lever supplied in the upgrade kit to prise it out — *be careful to insert it between the socket and the chip and* not *to put it under the socket.* Use gentle pressure and lift all four sides of the CPU evenly. Put the old CPU somewhere safe.

Step 4

● Because all current processor upgrades are square (i.e. symmetrical) it's quite possible to attempt to fit it into the socket in any of four ways, so take care to correctly orientate the new processor. This is easy: the socket will have a bevelled corner, or mark indicating the position of the corner pin; and the CPU will have a corresponding dot, or bevelled corner.

● Marry the two marks up and insert the chip, quickly checking beforehand that none of its pins are bent. Note that some Overdrive chips use an additional pin to orientate the chip in the socket, which makes it impossible to fit it the wrong way. If the ZIF socket is of the large Pentium Overdrive sort, insert your 486 Overdrive in the centre of the socket so that a line of pin holes remains visible on all four sides of the ZIF socket.

● Simply drop in the CPU, lower the lever and clip it into the locked position. If it's a PGA socket then you'll have to use some force to insert the chip — make sure the chip is level and goes in "straight" and evenly. Be very careful, too, not to overflex the motherboard. You may need to shift a few motherboard jumpers at this point to identify the new CPU, so have that motherboard manual handy!



The lever on the ZIF socket allows you to lock the new chip into place

Step 5

● Reassemble the PC, replace the lid, do up the screws and plug everything back in.

● Plug in all the cables and power up the PC. You'll soon know if the new processor has gone in okay — if it hasn't, the PC won't boot.

Explanation of acronyms and terms used

Low level	
CPU	Central processing unit.
Hard drive and peripheral interface standards	
BIOS	Basic input/output system.
Other terms	
Clock speed	The speed, in MHz, at which a microprocessor runs.

● If you have a "verbose" BIOS, which signs on with lots of information, it may tell you what sort of processor it recognises. To be extra sure, install the supplied diagnostic software that came with the upgrade just to make sure everything is A-OK.

Further reading

See *First Impressions* for a review of the MAke-it 586, from Improve Technologies, *vs* Kingston Technology's TurboChip 133.

PCW Contacts

Roger Gann can be contacted either by post c/o *PCW* or via email at **rgann@mcgilivray.win-uk,net**

Datrontech 01252 303333
Future Upgrades 01732 465566

No pain, **no gain**

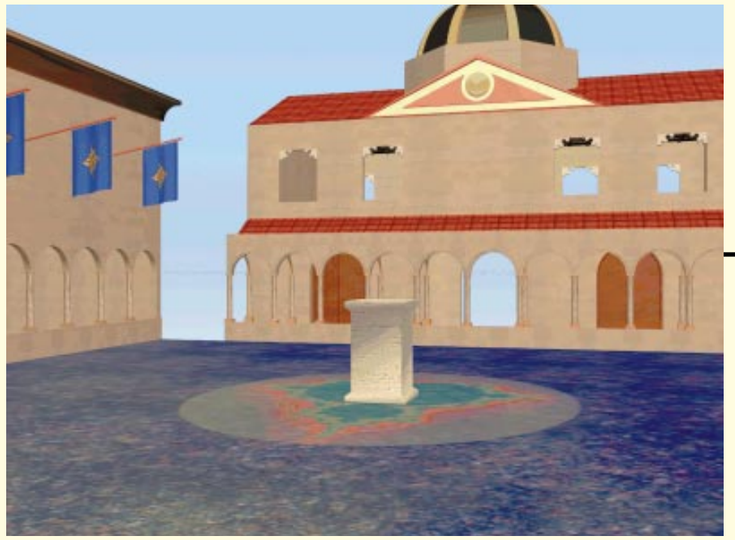
Vibrant 3D images can cause file management headaches. Benjamin Woolley looks at ways of dulling the pain, and dips a toe in the water of the 3D interface with DIR3D.

This spring, Silicon Graphics announced its development environment for creating Web content, "Cosmo". Among the suite of fabulously sophisticated and glamourous tools (including tools for integrating VRML and Java) was a rather uninteresting-looking fellow called "MediaBase". All it apparently did was help you organise your files. What a dull job.

Well, unfortunately, that dull job turns out to be one of the most important in generating any sort of media-rich content and this applies, squared, to 3D. Think of it as the bureaucracy of beauty (if that is not too tortuous): to get those wonderful, colourful, incandescent, textured images, you will need a lot of files — and you will need to know where they all are and what to do with them.

I have yet to encounter a 3D graphics package, or even a utility for the PC, that takes all the pain out of file management (if anyone knows better, I would love to hear from them). But I would easily rate dear old DOS-based 3D Studio (3DS) as one of the worst.

When you install 3DS on your hard drive, it creates a series of directories for each of the constituents that are likely to make up a 3D project: meshes (the actual geometries for 3D models), materials (for materials libraries), lofts and shapes (both for building 3D models out of 2D shapes), fonts, images, maps (for texture maps, though sometimes these are to be found in the images sub-directory), processes (containing the IPAS routines, or "plug-ins" as they are better known in the rest of the graphics universe) — the list scrolls on forever.



It took a total of 23 separate files to make up this scene, including some project files for individual elements (e.g. the flags), more project files to render up textures (the stars on the flag material), images generated by other programs (the Mandelbrot used in the floor material, from a fractal generator), texture maps from clip libraries (the marble finishes), 3D mesh files containing objects used to cut out the arch shapes, and so on

Supposedly, saving a file as a "project" overcomes the problem of having to deal with all these different file types (materials, 2D shapes and other elements are stored in the one .PRJ file), but you still have to remember where all the texture maps are, the lofts and shapes you may have used in some earlier version of the project, and the clip models you may want to merge into the scene. Also, any large project is likely to comprise a number of smaller ones merged together.

Windows packages (such as Truespace, Visual Reality, Extreme 3D and Ray Dream Studio) overcome a few of these problems because you are better integrated, with a friendlier operating environment. You have the Registry and Explorer on hand to help. Also, with Windows 95 and NT, you can use long files names — an advantage you should exploit to the utmost.

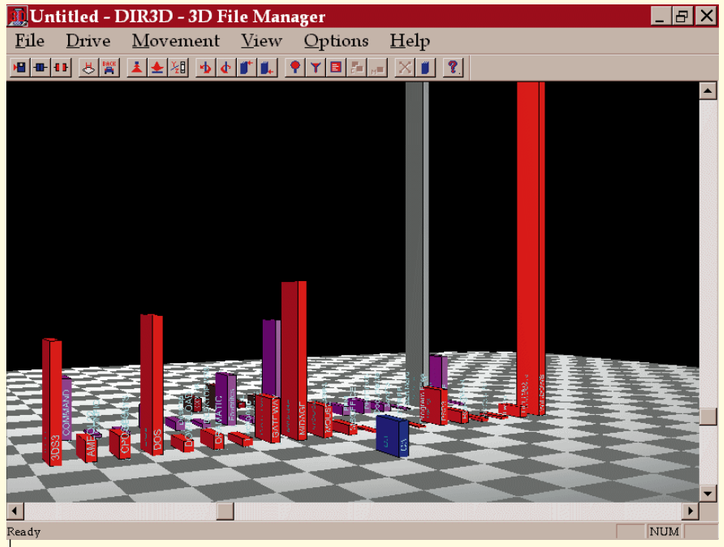
Avoiding problems

Nevertheless, no matter how disciplined you are, problems will still arise, so here are some ways of avoiding them.

Firstly, there is the obvious trick of creating a single sub-directory for each project. However, it is often better to add some sort of structure to this directory, so texture maps are in a sub sub-directory called "maps", and so on.

Secondly, there is the less obvious trick of trying to work out in advance what types of files you will need to use. This depends on the sort of package you are using. Are there separate formats for 2D geometry, for example? Do texture files need to be converted into a particular proprietary format (as they do in Extreme 3D)? Can you make the conversions in advance and do you need to keep the originals? The answer to the latter is yes, if you cannot reconvert.

Thirdly, you need to think about texture and bump maps. These files, which will be bitmaps (in some cases, including video sequences and animations) are the ones that cause the most problems. The reason? They are often huge and you are likely to be getting them from all over the place: from a clipart library, off the Internet, from your own image directories, from scans and from other rendering projects.



The Manhattan skyline, as produced by DIR3D's view of my local hard disk drive. The two World Trade Center towers are, inevitably, my overloaded Windows and System sub-directories: see how they dwarf the 3D Studio sub-directory on the left of the picture. The toolbar contains navigation buttons

Worse, you will often accumulate several versions: a high-resolution colour version for the texture map, a 32-bit version for Alpha channel data, a low-resolution greyscale version for the bump map, maybe a traced version to form the basis of a 2D shape for lofting. You have to discipline yourself to performing a regular cull of these files, printing out (or writing down) scene details for each project so you know what you have used.

A good tip is to keep an offline backup (on tape, say) called something like "originals" where you lodge one good high-res copy of every image you use, when you first use it. Then you can afford to delete online files when you reckon you have no further use for them.

It is tempting to believe that such problems will not arise as long as you bung all the required files into your new project sub-directory and sort out the mess later (my usual strategy). If you have a spare gigabyte or two of disk space this might work, but in the real world you will soon find yourself having to make room for new materials the whole time, deleting and moving files on the fly, hoping you have kept all you need but never quite knowing whether that "bricktmp.bmp" was really just a temporary scratch file for the brick surface you used in an earlier version of the project, or the one you ended up using.

Unfortunately, being an anal-retentive is the only solution to the file organisation problem until some clever company produces a version of Cosmo MediaBase for the PC market. It is not a very glamorous product category at a time when everyone is wanting to be the next Netscape, so don't hold your breath.

Beyond the GUI

When Alan Kay and his cohorts at Xerox's Palo Alto Research Center came up with the design for the graphical user interface, it was but a short logical step from a two-dimensional space (a "desktop") into a three-dimensional space.

Researchers at PARC itself have toyed with this idea, producing proposals for what they called the "Information Visualizer… a user interface paradigm that goes beyond the desktop metaphor to exploit the emerging generation of graphical personal computers and to support the emerging application demand to retrieve, store, manipulate, and understand large amounts of information."

How, then, would one go "beyond the desktop metaphor"? You could have a 3D representation of an office with a 3D desktop, a 3D filing cabinet with 3D drawers full of 3D files, a 3D waste paper basket (wow!) and, down the corridor, doors leading into the 3D "offices" of other users in your network neighbourhood.

You could, borrowing from the metaphor used in the interfaces such as Apple's eworld online service, have a door leading out into a street with buildings representing different services: point and click at the library, and you are offered a series of information services; point at the bank and you get financial services, and so on. It sounds quite seductive but so far nothing much has come of the idea. Nevertheless, things may be about to change.

One modest first step into the realm of the 3D interface is DIR3D, a Beta version of which I downloaded from the Web site of the program's authors, Regnoc (www.regnoc.com). It's nothing more than a version of the Windows 95 Explorer or 3.1/NT File Manager, in which the contents of local and network drives are represented as a 3D bar chart with the height of the bars showing the size of the directory.

Regnoc prefers a more glamourous urban metaphor in its description of the program, calling each directory a "building", and each file within it known as "floors". Hierarchy (the relationship of directory to sub-directory, to sub sub-directory and so on) is represented by the z axis: the root directory is at the front of the scene, the next level of directories behind it, their sub-directories behind them.

You use DIR3D by moving around the city, finding the building (i.e. directory) and then the floor (i.e. file) you want. When you click on the floor, it slides out — the urban metaphor is beginning to collapse here. This selected floor can then be subjected to any of the usual file operations that you would use with Explorer: copy, move and delete. You can right-click on the floor to get the associated file's properties and run it (assuming the file type is registered).

As implemented in DIR3D, the 3D interface idea seems to be little advanced but the program demonstrates a couple of interesting things. First, it shows a potential use for OpenGL, the 3D renderer built in to Windows 95 and NT. OpenGL works efficiently on Pentium systems, enabling programs like DIR3D to create pretty solid-looking 3D environments on the fly (not Doom standards, but that will come). Secondly, DIR3D suggests some possible ways of using VRML.

As most people now know, Microsoft is planning to integrate Web browsing into Windows 95. It might be possible to integrate 3D browsing too, so the interface to your system could be a VRML scene populated with 3D shortcuts to local files as well as remote resources.

PCW Contacts

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Type casting

If you thought Sans Serif was a resort in Spain, read on. Gordon Laing tells you things you always wanted to know about fonts but were afraid to ask.

"Typographic arrangement should achieve for the reader what voice tone conveys to the listener."

We're talking about fonts — I can't get enough of the things. However much my colleagues snigger at my obsession, I know they have a secret yearning to join me in a little typographic trainspotting. You see, they're really into it, too. It's just that they don't yet realise it.

With the advent of personal computers, graphical user interfaces and vector page description languages (such as PostScript, the digital typeface) are an everyday reality. All Windows and Macintosh users take scalability, what-you-see-is-what-you-get and smooth output for granted.

But like most aspects of computing, there's a fair amount of technology working behind the scenes. Unsurprisingly, there are also competing formats and implementations, each fighting for your attention.

It's always handy to understand the inner workings, and it's been a while since the subject's been covered, so this month's *Graphics & DTP* is everything you wanted to know about fonts but were afraid to ask.

Font or fount?

So, what is a font? Those with active vocabularies will almost certainly think of baptism, but as far as typefaces are concerned, the dictionary immediately passes the buck on to the word "fount", which it describes as "a complete assortment of types of one sort, with all that is necessary for printing in that kind of letter".

The word fount comes from the Latin, "to cast". Indeed, much of electronic publishing terminology harks back to the old days of the printing press. The part about "all that is necessary for printing" refers to the old, individually cast, characters; one for each style and size. The word "font" is an Americanism of "fount", but in its electronic form means much the same thing, in that each comes with "all that is necessary for printing".

Who's Mimi? For now, a demonstration of proportional spaced fonts. The letter m is usually the widest character, and the letter i the thinnest. At the top is Courier, a non-proportionally spaced font. Notice how the serifs are artificially widened to make all characters the same width. Below is Times, a proportionally spaced font, with naturally thin i's and wide m's. Out of interest, a wide dash is known typographically as an em dash, since it is the same width as a letter m in that font style; narrow dashes are en dashes

Serif or sans-serif?

There was a time, not so long ago, when all computers were limited to displaying one font on their monitors. Similar to mechanical typewriters, all the letters took up the same amount of space on the page, regardless of their actual size. This is known as mono or non-proportional spacing.

Look at the letters m and i. The i is much narrower, but occupies the same space on the page as any other letter in a non-proportional system. This extra space looked messy and spurred type designers to artificially widen the narrower characters to fill the gaps. The design they came up with for typewriters was Courier, a style familiar to all of us and over-used in recent times to convey a retro or Mission Impossible-type mood.

At the time, most printers came with the option of choosing from a couple of built-in fonts. These were usually selected by a switch on the printer and were described simply as Serif, or Sans-serif. Serifs are lines or curves projecting from the end of a letterform. Fonts with these additional strokes are known as serif fonts.

The word "serif" is derived from the chiseling marks found in Roman stone monuments; indeed, serif fonts are often referred to as Roman. However, uncapitalised roman describes vertical characters as opposed to italic. Italic characters slope to the right and are often known as oblique.

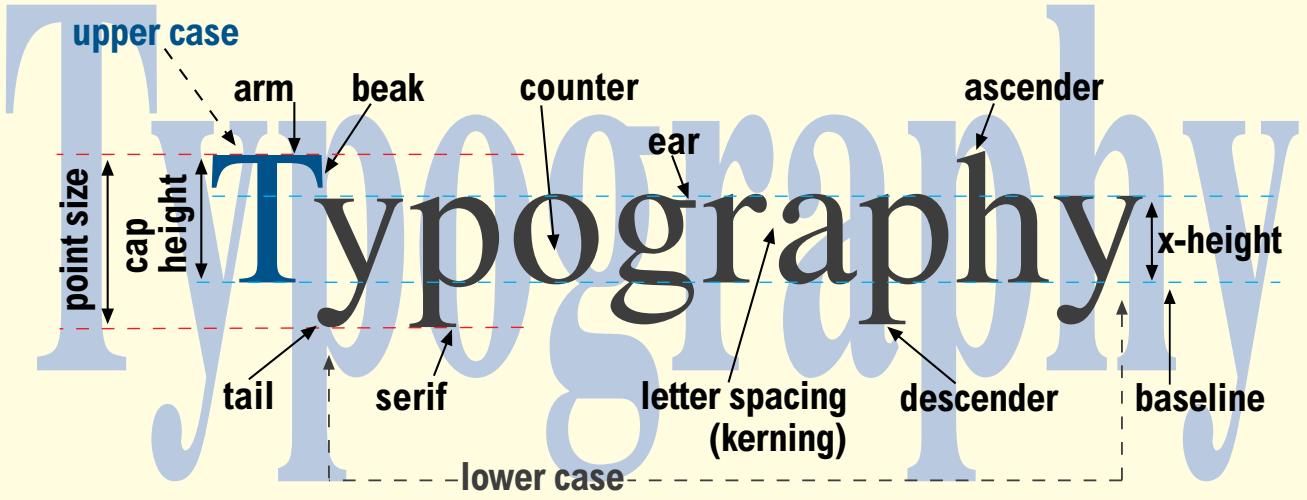
"Sans" is the French word meaning "without"; making sans-serif fonts those without the additional strokes. Probably the most famous sans-serif font is Helvetica (or Arial).

Times is the best known serif font. Studies have shown that at body-text sizes, serif fonts are easier to read — the idea being that the serifs help guide the eye from letter to letter. At larger or smaller than body-text sizes, sans-serif fonts seem to work better.

The advent of WYSIWYG

Proportional spacing and scalable fonts arrived on the desktop around 1984 courtesy of Adobe, just one year after it developed the PostScript page description language.

The shape of each character in Adobe's Type 1



font format is described by a PostScript program. These descriptions can be displayed and printed at any resolution, in any colour and at any degree of rotation. Each character incorporates spacing information.

Type 1 fonts also contain hinting information. Certain line weights and serifs may look great on characters output at two inches high but could look fiddly, or even illegible, at smaller sizes. Hinting is the process of adding information to a character's outline, slightly altering various aspects to improve its appearance at low resolutions and point sizes.

PostScript software and Type 1 fonts are device independent, meaning they are not tied to a specific device or resolution. The same Type 1 font can be used for a 72dpi display screen, a 300dpi laser printer or a 2400dpi imagesetter. In order to be printed or displayed it must still be turned into a bitmap, but the same single outline description can be used for all devices; one very flexible file, requiring little space and offering the desirable prospect of consistency across devices.

The process of turning a vector outline (such as a Type 1 font) into a bitmap at the desired resolution for printing, or display, is known as rasterisation. If you wanted to view or print the shape, it needed to be rasterised into a bitmap. PostScript printers could rasterise Type 1 fonts for printing, but for a while nothing could do it for on-screen use. Each Type 1 font consisted of several files: one for the vector outline (useful for the printer alone), and a small collection of pre-rasterised bitmaps for on-screen use. Hence the terms "printer font" and "screen font".

When a size was chosen for which a bitmap didn't exist, the on-screen result appeared jagged. Imagine zooming in and out of documents, effectively requesting countless bitmaps at obscure sizes: it looked like we were stuck with the jaggies for a while.

Then, in 1989, Adobe Type Manager (ATM) arrived. It took outline printer fonts and rasterised them on the fly, at any resolution, for on-screen use. This apparently processor-intensive task was absorbed by faster hardware becoming available, and any pause of a couple of seconds as the screen re-drew was more than compensated for by the smooth and accurate font shapes.

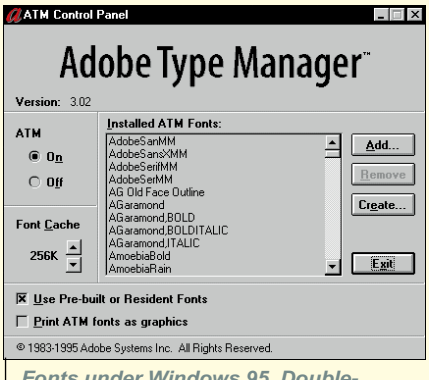
ATM could even rasterise Type 1 fonts for non-PostScript printers. Under Windows, it even handled the installation and management of Type 1 fonts — a totally invaluable utility for Windows or Macintosh users of Type 1 fonts.

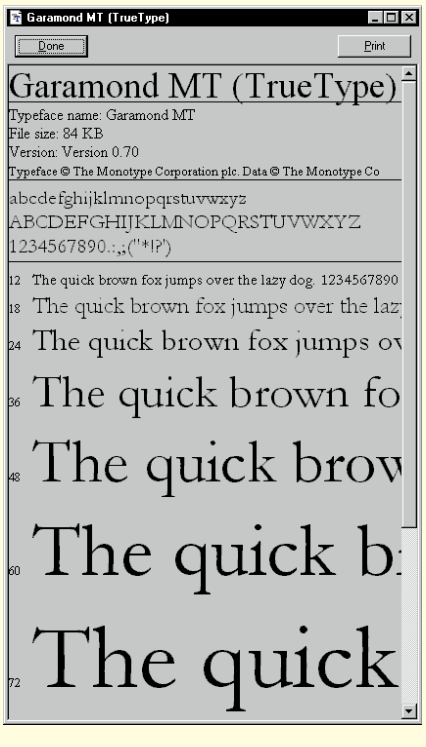
Just my type

You'd be forgiven for thinking the digital type world consisted entirely of fonts encoded in Adobe's Type 1 format. While Type 1 was the original and remains the standard in professional publishing, other formats and implementations sprung up to compete.

TrueType was developed as a joint venture by Apple and Microsoft. Windows 3.x, NT, 95 and Macintosh System 7.x operating systems come with a rasteriser for TrueType, but not Type 1 fonts. ATM is the only rasteriser for Type 1 fonts, costs £40, and is bundled with many applications, notably those from Lotus and, unsurprisingly, Adobe. Incidentally, ATM is built into IBM's OS/2.

TrueType fonts do not require accompanying pre-rasterised bitmaps on either Windows or Macintosh. It is possible, but not recommended, to use Type 1 fonts on a Macintosh without ATM. On such a Mac, the system relies on screen fonts for display and that's why all Macintosh Type 1 fonts must have at least one pre-rasterised bitmap screen font for compatibility. Since





Fonts under Windows 95. Double-clicking a TrueType font file offers the helpful information, right. PostScript Type 1 fonts are handled by Adobe Type Manager, ATM, above. The current version does not offer previews of Type 1 fonts

Font of the Month

FF Meta+

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abçdéfghijklmnöpqrstuvwxyzß&1234567890

Windows requires ATM to install Type 1 fonts (which can also rasterise them), bitmaps are not required.

Each OS happily operates with TrueType and Type 1 fonts simultaneously — even in the same document. But which is better?

Adobe claims that ATM is relatively more intelligent than the TrueType rasterisers. Consequently, Type 1 fonts can be smaller in file size than TrueType and take less time to download to a printer. Smaller file sizes require less space on your hard disk, too. On the other hand, Windows only downloads the actual characters of a TrueType font used in a document, whereas ATM downloads the whole character set.

PostScript and Type 1 still dominates the professional printing world. It's been around longest and consequently has an almost religious following in publishing circles. Although TrueType is catching up fast, there are currently more fonts available in the Type 1 format.

In publishing, there's the big issue of making sure the people who print your pages have exactly the same fonts you've used on your document. Missing fonts, resulting in substitution and reflow, is a surprisingly common nightmare. Merely sharing the same names isn't enough: the fonts have to come from the same foundry and supplier and this level of certainty is only truly offered by Type 1. One big endorsement comes from the International Standards Organisation, which in ISO specification 9541 identifies Adobe's Type 1 format as the worldwide standard for outline fonts.

Of course, if you're outputting only to a local printer or aren't bothered about absolute perfection, then any format will do. In this situation, it boils down to price and availability. There are a huge number of budget collections, more often than not in TrueType format, many consisting of subtly different copies of famous *proper* fonts.

Serious typographers will gasp with horror that anyone could even consider using these imposters. but they're more than sufficient for the majority of users.

Bitmaps — the last word

With scalable outline fonts galore, you'd wonder whether it's worth bothering with bitmaps ever again. The answer is a resounding, "kind-of ".

Many Windows and Macintosh system fonts are bitmaps — they're the ones you find on title bars, on menus and under icons. They look fine at that fixed size but try to scale them and the jagged edges will reveal themselves.

FON files are Windows bitmap fonts without accompanying outlines. They may consist of bitmaps at a number of sizes and are often used within email messages to ensure compatibility with as many other systems as possible.

Adobe Type 3 fonts are bitmap descriptions not requiring ATM but are rarely seen these days. One small advantage over Type 1 and TrueType is their ability to contain anything other than a solid fill — they could have a pattern of some kind.

A final word on file extensions. TTFs are, unsurprisingly, the TrueType outline files while Type 1 Windows fonts consist typically of two files: PFM and PFB. The PFB is the outline description, while the PFM contains information about the font such as letter spacing.

Next month we'll take a further look at fonts, including character sets and the many gems the Internet has to offer.

Font of the Month

Typographer Eric Spiekermann's aversion to Helvetica as a corporate typeface is well known. His alternative, Meta, was designed in 1991 and has become Fontworks' best-selling typeface. Eric has revised his original design, adding additional weights and cleaning up the kerning and some outlines. The result is the fabulous FF Meta+ *(pictured above)*, exclusively available from FontWorks.

PCW Contacts

Any burning font questions or tips? Write to me at the *PCW* address on Broadwick Street or email me as **gordon_laing@pcw.ccmail.compuserve.com**

FontWorks 0171 490 5390

Mad March gets our men in a muddle

Oops! Panicos Georghiades and Gabriel Jacobs have been the hapless victims of the great banana-skin bug... On a brighter note, Panasonic pitches in to help developers, and a new Director gets ready for action.

March wasn't too good a month for us in terms of accuracy! A number of people working in higher education emailed us about our section in the March *Multimedia* column entitled *"When it comes to the Crunch"*. Our fault: the email address of the Association for Learning Technology in Oxford should have read: alt@vax.ox.ac.uk

We also apologise if (on page 297 of the March issue) we gave the impression that a single 4Gb hard disk costs £400.

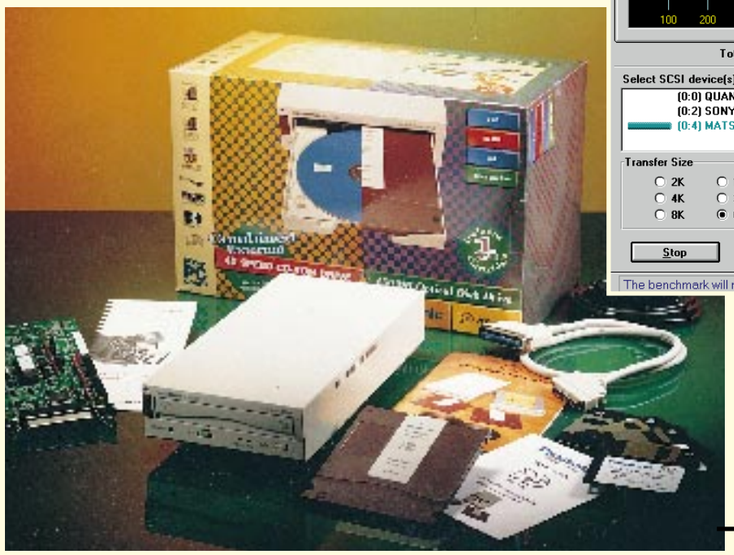
Two readers, A.J Elliott <100112.2612@compuserve.com> and Sumeet Kapur — dbae005 <dbae005@uce.ac.uk> — have been asking where they can get one?

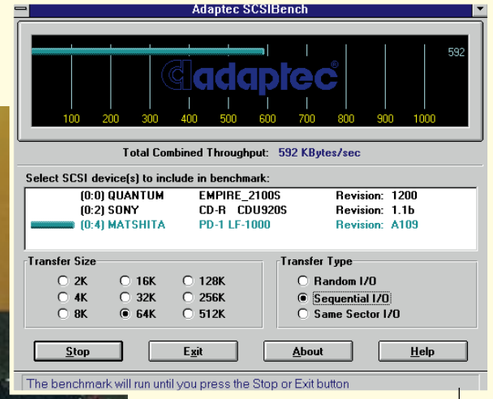
Well, the fact of the matter is that the cheapest price for a single 4Gb drive is around £650. What we really wanted to say was that you can obtain 4Gb of hard-disk space for about £400, and what we had in mind was the new Iomega Jaz 1Gb removable drives. Cartridges have been advertised at less than £100. A similar drive from Syquest claims a transfer rate of 4Mb/sec — good enough for video work.

Note that you can also obtain the Seagate 2.1Gb ST32140A drive for about £240. We can't name specific suppliers — so look in the advertisement section.

A drive for multimedia developers

The same theme — cheaper storage — brings us to the Panasonic PD optical drive. With the recent cuts in the price of this drive (you can get an internal version for as little as £350 plus VAT), this has now become a pretty big temptation for multimedia developers who generally require more disk storage and higher performance than most other people in the computer field. So we thought that it would be a good idea to test one and see how it performs in areas related to multimedia development.





Above *The Panasonic PD drive is ideal for testing multimedia applications designed to run on a quad speed CD-ROM*

Left *Pansonic's PD System combines a 650Mb rewritable optical disk with a quad-speed CD-ROM drive*

...and here is the news

● Asymetrix has released a new version of its Toolbook CBT edition (version 4.0), and Aimtech has released CBT Express version 2.0. Aimtech is also said to be about to release a sub-£1,000 version of its IconAuthor package, called IconAuthor Lite. And the new version of Macromedia Director is now shipping (see page 312).

● Data Translation's Multimedia Group has launched version 2.6 of its Media 100 (£8,795, excl VAT) professional non-linear video editing system. This offers broadcast-quality pictures using 2:1 compression, eight tracks of CD-quality sound, and many more features.

● The ubiquitous Microsoft has unveiled two more technologies. One is SIPC — Simply Interactive PC framework — to give some brains (that is, parts of the Windows operating system) to dumb hardware such as VCRs, TVs and consumer hi-fi systems, so that PCs and consumer entertainment machines can communicate with each other via a universal serial bus.

The other Microsoft technology is ActiveMovie, a cross-platform digital video technology for the desktop and the Internet. With this you'll be able to create and deliver titles on multiple platforms with synchronised audio/video and special effects.

Benefits will be fast playback of all popular media types over the Internet and MPEG-1 playback in software-only on a Pentium 90 with a low-cost graphics card at 24 frames per second with 11KHz audio. MPEG II (which will be used on the new Digital Video Discs) is also supported.

This has meant the creation of a new file format: .ASF (ActiveMovie Streaming Format) which is data independent. Streaming means that playback can start without having to download the entire file.

The PD drive is, in fact, two drives in one. It is a rewritable optical drive: each cartridge holds 650Mb (about the same as a CD-ROM) and costs £39. It is also a four-speed CD-ROM drive. It can only act as one of these two things at any one time, but it automatically detects what kind of disk is in, and then re-identifies itself.

If you have a SCSI adaptor, installation is simple. If you don't, you have to go through the rigmarole of installing a SCSI adaptor: something which will either give you a nervous breakdown or be as easy as pie, depending on your PC configuration. Panasonic supplies an Adaptec SCSI-2 adaptor, as an option. The PD drive installs itself as two extra drive letters: one for the optical disk and another for the CD-ROM.

The CD-ROM behaves well. The transfer rates and access speeds we got from our tests matched approximately those of the specifications (600Kb/sec and 195ms). The CD-ROM drive also played our Video CD disks — using a Showtime Plus board — with no problems. And we managed to grab CD-audio data via the SCSI port digitally and save it as a WAV file, using Corel's CD player utility.

Of greater interest to us, however, was the optical drive. Because its capacity is near that of a CD-ROM, in theory it ought to be a good means of testing multimedia applications, instead of writing one-off CDs and sending data to CD-ROM pressing plants. Also, because of the inexpensive disks and relatively fast performance, it should be a good option for backing up. And then there's simultaneous work: it ought to allow you to work on many projects at the same time instead of being restricted to the normal hard disk.

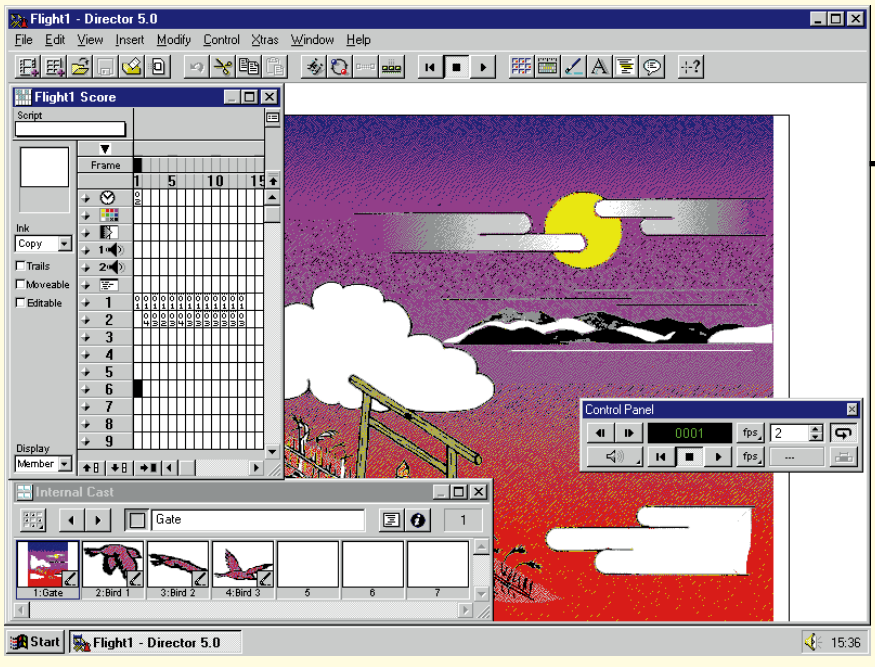
We first tested the drive using standard testing software from Adaptec. The results varied from about 250 to 1,280Kb/sec, depending on the size of the file used (2Kb to 512Kb), and whether access was sequential or random. However, standard software of this kind uses small files for the tests which are not representative of multimedia applications using audio and video files.

In our own, similar, tests of reading and writing large files to the drive we found the average transfer rate to be about 350Kb/sec.

The drive managed to play three tracks of 44KHz 16-bit mono audio files at the same time with no problems, and four tracks with very little crackling noise (four mono tracks amount to 4 x 44.1 x 2 = 352.8Kb/sec).

We also managed to grab video directly on the drive using a resolution of 384 x 288 at 25fps and with a transfer rate of 350Kb/sec without losing a single frame. At a setting of 400Kb/sec it lost about 15 percent of the captured frames. Though you wouldn't actually use such a drive to capture video, you would definitely want to use it for testing playback.

Given, then, that the optical disk's speed and transfer rate are similar to those of a four-speed CD-ROM, the drive will



Macromedia Director 5 now offers support for the Internet, using Shockwave

indeed be perfect for testing material to run from a four-speed CD-ROM, though its performance for material to run from a two-speed CD-ROM will, of course, be on the optimistic side.

As for the drive's usefulness and cost-effectiveness for working on multiple projects, yes, certainly, since the alternatives are still a bit more expensive — and some not even there! The Iomega Jaz and Syquest 1Gb drives we mentioned earlier are still not available at the time of writing and the blanks are advertised at about £100. The cheapest hard disks (which can be made removable) are about £250 for 2Gb. In addition, the PD disks have a longer lifetime than hard disks: they are guaranteed for at least 15 years.

When it comes to sending data to pressing plants on a PD disk, six out of ten places we contacted would accept these disks; so little or no problem on that score.

Our verdict is, therefore, that this drive generally comes up to our expectations. It's really very good for storing data and for testing CD-ROM material and we can recommend it as a good buy for multimedia developers. It's also a very good backup system, and you get a CD-ROM drive to boot (to ruin a phrase!).

A new Director hits town

Macromedia's Director is probably the most widely known and used multimedia authoring package around as far as commercial CD-ROM titles are concerned.

Its great success can be attributed to its dual-platform compatibility (with Mac and PC) in addition to its animation facilities, which suit both presentation-type and storybook-type titles. Director 5 is the second Windows release, but the fifth for the Macintosh, and as with version 4 you only need to author once, to distribute on both machines.

Version 5 extends itself now to the Internet. As we have seen with IconAuthor 7 (last month), the Internet is clearly the area where development-tools software companies are seeing the largest growth at the moment. We're not saying that the Internet is where most users will get their multimedia information but this is the area where most development will happen. Why? Simply because everyone wants to put pages of their business onto the Net — it's the in thing.

Director's support for the Internet is through Shockwave. This is essentially a software tool which makes the Internet provide support for Director, instead of the other way around.

A utility called Afterburner post-processes Director source files to protect and compress the content by 40 to 60 percent, in order to increase performance. You can control the type and amount of compression for each media type including LZ77 lossless compression, IMA audio compression and lossy image compression.

For longer Director movies, Streamed Media Xtras allows users to receive a constant stream of data from a server to their computers, so that they notice no delay as they view video or listen to audio as it downloads.

You can also connect to the Net from a hot-link in a Director movie played from a CD-ROM or your hard disk. New Network Lingo commands support URLs (Internet addresses), and can take you to HTML (hypertext) pages on the Net. You can link to other Director movies on the Net, too.

At the moment there's support for Netscape Navigator 2.0, with support for Microsoft Explorer 3.0, CompuServe, AOL/Navisoft, and SGI WebForce to come. If you wish to see an example, visit the Deep Forest Web site (developed by M/B Interactive in the US (phone 001 212 539 6992), which uses no HTML. It's all done using Director movies.

Some of the other new features include built-in formatted text (you can now import RTF files) and there are controls for text manipulation such as kerning, tracking, line spacing and indents. Text is automatically anti-aliased against any background to smooth out jagged edges.

There's now support for Photoshop/Premiere image filters, and you can alter filter parameters over time to create animated effects.

Director 5 introduces a new cross-platform standard for third-party extensions, replacing the use of XObjects and DLLs. It's claimed that Lingo now executes 50 percent faster. Movies can be pre-loaded in the background, giving you more control over managing performance. There's now a Lingo debugger, too; over 100 new Lingo commands, and a new user interface consistent with other Macromedia products.

And there's so-called onion skinning — the ability to see other cast members in the Paint window, making cel animation easier (yes, that's *cel*, which is animation created by moving an object over a background).

Additionally, it's worth mentioning that OLE objects can now be used as cast members in Director movies.

Director 5 supports Windows NT, 3DO, OS/2, OS/9, SGI and Enhanced CD.

PCW Contacts

If you have any multimedia-related problems or queries, email us at **g.c.jacobs@swansea.ac.uk**. We're sorry, but we can't answer queries by personal reply — we'd be at it all day! But we're glad to publish queries, with our answers, which we think will interest *PCW* readers generally.

Data Translation 01734 796100
Panasonic 01344 853913
Macromedia 01344 55644

Rise and shine

Polishing up Win95's audio performance and upgraded Windows software for AWE-32 are at the top of Steven Helstrip's ladder this month. Plus, short-cuts to keyboard skills.

Improving the audio performance of Windows 95 is a subject that seems to have every MIDI-related Web page talking at the moment. Although Windows 95 has bags of utilities to increase disk performance, sometimes these can have a negative effect when it comes to recording and playing back audio.

From the many hints and tips I have come across, I have found three that work effectively:

1. Read-ahead optimisation

This is a feature that Windows 95 uses to increase disk performance. It works by reading more data from disk than is actually requested by an application.

In most cases, full optimisation is recommended. However, you may find that turning this function off will provide better results when playing back multiple tracks of audio.

It is also worth experimenting with 16 and 32Kb settings. To adjust these settings, open the Control Panel and double-click "System". Then go into the Performance section and select File System: a slider enables you to choose from 4 to 64Kb of read-ahead optimisation. There is no definitive setting, since every machine is different.

2. Disk cacheing

Unlike Smartdrive, found in Windows 3.1, the disk cacheing system within Windows 95 does not have a fixed size. The amount of memory needed for cacheing can increase when disk-intensive applications are running, which in turn forces data stored in memory to be paged out to slower virtual memory. This can interrupt the data flow needed for solid audio performance.

By setting a maximum size for the cache, you can avoid some performance degradation. To do this, you need to insert a line into the System.ini file, which can be found in the Windows directory. Under the heading [vcache], type

```
MaxFileCache=2048
```

If you have only 8Mb of RAM installed, this amount should be set to 512.

3. Virtual Memory

When left to its own devices, Windows 95 will determine the size needed for the SwapFile, or Virtual Memory.

Like its disk cacheing system, this can increase and decrease in size depending on how it sees fit. By setting a fixed size, audio performance can sometimes be improved. It is recommended that you allocate two and half times the amount of RAM you have, for a SwapFile. Therefore, if you have 8Mb of RAM, the SwapFile should be set to 20Mb. The applet to change these settings can also be found in the Performance section of the System dialogue.

Windows 95 in AWE

Windows 95 software for the AWE-32 is now available from Creative Labs. It contains updated drivers and support for long file names in each application.

One of the best reasons to upgrade, though, is to take advantage of the new control panel, which makes the handling of sound banks and samples much easier.

The control panel allows .wav files to be loaded into RAM without having to create sound banks and provides a "virtual" keyboard, enabling you to play samples without having to load up your sequencer.

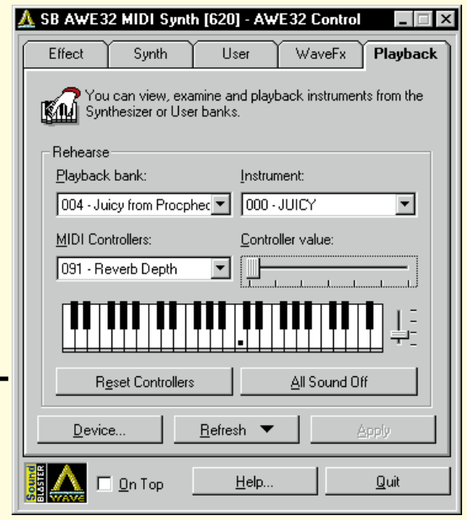
I have several grudges, though. Firstly, Vienna doesn't like to share the AWE-32 with any other MIDI applications. Therefore, when you need to edit a sound bank, you must first close down any MIDI applications that are running.

Secondly, you still cannot save entire sessions, or the contents of user RAM, as one file. This is very frustrating: each time I need to go back to an old song, I have to load anything up to 20 files, individually.

Thirdly, several months back I mentioned that the paths and file names for user banks are stored in a file called sbwin.ini; in the new software, this file no longer exists. It's now stored in the Windows 95 Registry, as I recently discovered. In stumbling across this, however, I have devised a system that allows whole sessions to be saved and re-loaded. It's a bit cumbersome, I admit, but it works. The file you need can be found buried deep inside the registry editor. To run this, type "regedit" from the Run dialogue found in the Start menu.

To quickly find the folder needed, select "Find" from the Edit menu and type UserBank. The contents will be displayed in the right-hand column. From the File menu you then need to export this file, preferably to a new folder since this will enable you to quickly find the files at a later stage.

There are two ways in which you can manipulate these files. By clicking the right mouse button on the file icon, you can select either Edit or Merge. Edit displays its contents as text, which can then be copied and pasted into your sequencer's notepad for future reference. Alternatively, Merge enters the data back into the Registry. When you next restart Windows, the files will be automatically loaded, saving you the time of finding and loading them individually.



The new control panel for the AWE-32 makes life easier, but not too much

● **Windows 95 tip:** The quickest way to restart Windows is to hold down Shift and select "restart computer". This restarts Windows only and not the PC.

Cubase goes audio

Last month I wrote about an update for Cubase Score 2.0 that fixes problems with printing and enables Windows 95 users to see the MIDI activity display. Since then, and less than six months after Score 2's release, the boys at Steinberg have updated Cubase to version 3. They don't hang around, do they?

Although there's nothing new or exciting to be found in the MIDI department, audio has been added to each program along with 32-bit editing. Existing prices will remain, which means you can buy the industry standard package with audio thrown in for only £329 (incl VAT).

Like Quark XPress is to publishing, Cubase has always been the only serious option for the professional market. Before now, this was reflected in the price of Cubase Audio; a massive £900. Now, at a fraction of that cost, it will force the likes of Cakewalk and Musicator Audio to be significantly cut in price, which is good news for all of us. If you want to find out more, there's a review in this month's First Impressions.

Play-along-a-Liszt

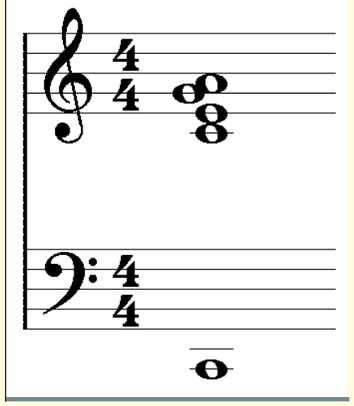
I am often asked, "What's the best way to learn the piano, or keyboards?" Always, my answer is that

Cubase now comes with eight tracks of audio as standard

Chord of the Month

This month's chord is C6. It is often used to thicken texture in blues pieces and is popular among guitarists.

When played with an A in the bass, the chord becomes Am7.

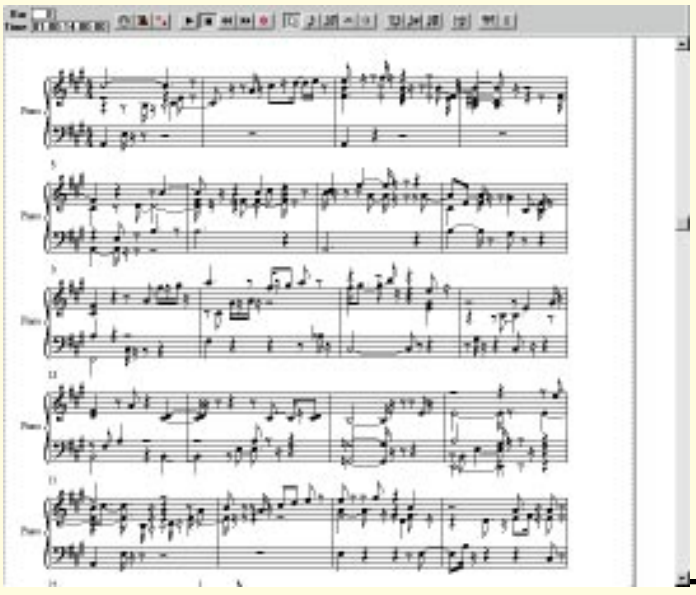


Creative Essentials: Electric Dreamz

This is the fifth CD from the Creative Essentials library. Like the others in the series, it has over 200 samples in both audio and 16-bit .wav format. It starts with around 40 analogue pads (which bored the socks off me) before getting into some meaty Bass Station samples. Many of these have been recorded over several octaves, and with varying degrees of filter applied to them.

After the Bass Station come some mad analogue effects, which definitely belong in The X Files. Further into the CD come a load more effects, then some more and, er, some more. Some of the sounds available are quite curious, with names like Spanner in the Works, Welcome to the Machine, Glass Spider and Night Stalker.

Many samples originate from a wide range of analogue synths. However, some rather unorthodox instruments have been used, too. Screwdrivers, a frog and tin cans are just a few of them. If you're looking for original sound effects to use in games or film, this CD is a worthy buy. Otherwise it doesn't have much use. Electric Dreamz is available from Time + Space.



Importing MIDI files into your sequencer enables you to view and print full scores

You, too, can be a great classical, jazz or ragtime pianist with the Pianist series

there isn't a best way, and that nobody should go through ten years of classical training if all they want to do is play "Roll out the Barrel" down at the local on a Friday night.

At the end of the day, nothing can beat a solid practice regime: say, one hour a day, or more if you have the time. There are, however, lots of short-cuts if you own a PC with a sound card or MIDI setup.

Every style of music is now widely available in standard MIDI file format; from Bach to Bon Jovi and everything in between. By loading these files into a MIDI sequencer that has a score editor, not only can you view the music and print it out, you can also hear it being played by the professionals. The main advantage of using this method is that you can slow songs down, solo the left-hand part, and even loop difficult sections until you have perfected them yourself.

There are also plenty of programs around to help you learn technique and improve your reading. One of my favourites is the Pianist series, a collection of eleven programs covering classical, jazz, ragtime and Gospel styles.

Each program comes with around 90 MIDI files, all professionally recorded, with a weighted MIDI keyboard. An on-screen keyboard displays the keys being played and you can view each piece in traditional notation, too.

In addition, you can test your music knowledge with the trivia quizzes and find out everything you ever wanted to know, and more, about each composer featured in the programs. The accompanying MIDI files can be imported into any sequencer for further study.

The Pianist series is available for Windows, Mac and Atari ST, from Turnkey. If you hurry, you'll get a free copy of The Ragtime Pianist with any order.

PCW Contacts

Readers' contributions to the Sound column are music to our ears. If you have any hints or tips, any MIDI-related items or general comments, send them in to the usual *PCW* address, or to **steven_helstrip@pcw.ccmail.compuserve.com**

Creative Labs (Windows 95 software for the AWE-32 from around £12) 01743 248590
Harman Audio (Cubase updates, £329 incl VAT) 0181 207 5050
Time + Space (Electric Dreamz, £19.95) 01442 870681
Turnkey (Pianist series £49.95 incl VAT) 0171 379 5148

Right, said **thread**…

Tim Anderson explores threads in Delphi 2.0, picks up snippets from the VBITS conference, and answers your VB queries.

Microsoft's theme for 1996 is the Internet, which featured strongly at the recent London VBITS conference for Visual Basic developers.

At one session, the presenter rashly asked how many delegates were actually developing for the Internet. A scattering of hands were raised. Okay, how many plan to develop for the Internet? A few more hands. The message is that while tools vendors steam ahead with Internet products, the actual developers are mostly stuck in the old world of databases, accounts and local networks.

Another key question is how many developers have switched to 32-bit Windows. Microhelp's VB or OLE tools is a new product, available in 16- and 32-bit versions, and distributor Contemporary Software, exhibiting at VBITS, reports that sales in the first quarter of 1996 were 57 percent in favour of the 32-bit product — a one-off statistic but an indication that the move to Windows 95 and NT is finally happening.

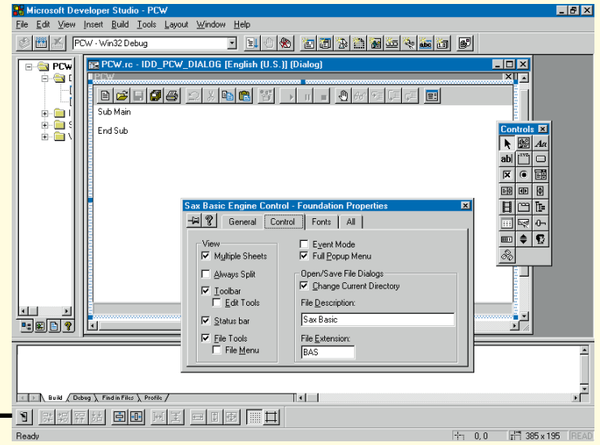
Those who did attend found a high standard of presentations, including API guru Daniel Appleman's demonstration of how to write a VB interface that runs as fast as C++. The answer is don't use controls, use VB's drawing methods instead. Of course, if you write VB applications like that you will be even less productive than your C++ counterpart. Even so, a point well made and a warning to go easy on controls, and especially VBX or OCX add-ons, if fast performance is a priority.

As expected, there are plenty of new Internet add-ons for Visual Basic and Visual C++. Microsoft's Internet Control Pack is a free download (beta at the time of writing) and contains OCX controls for integrating Web viewing, email, newsgroups and FTP file transfer into applications.

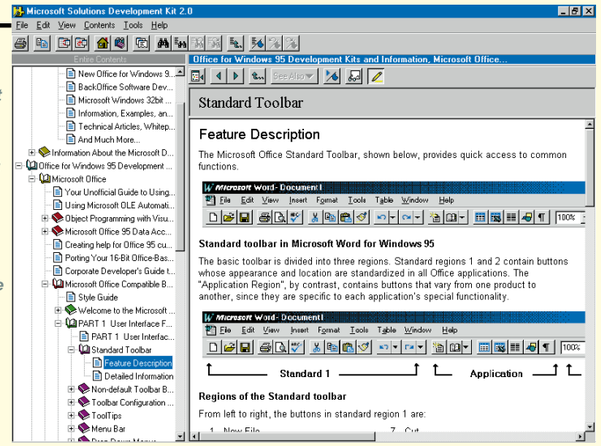
It's also been announced that Visual Basic 5.0, due out this year, will be able to create Active controls; another name for lightweight OCX components for Internet use.

The Internet again features in Visual C++ 4.1, an important update which adds MFC support for the Internet Information Server, Microsoft's Web server for Windows NT. A generous set of 12 third-party OLE controls has been added to Visual C++ 4.1, including Desaware's souped-up list box, the Sax Basic Engine for adding macro language support to your application, and Protoview's Interactive Diagramming Object for displaying data in the form of a diagram that can be visually modified by the user.

Finally, Microsoft has released the Solutions Development Kit, a CD which updates the Office Development Kit for those building applications with Office for Windows 95. For the latest news on Microsoft's tools, browse around the company's home page at http://www.microsoft.com.



Visual C++ version 4.1 comes with additional third-party controls including the Sax Basic Engine



The Solutions Development Kit is for high-level development with Microsoft Office. This page shows how to create an office-compatible toolbar

Books for Visual Programming

Wrox Press delivered one of the first books on Delphi 1.0, and now repeats the performance with *The Revolutionary Guide to Delphi 2.0*. Unfortunately, the trick is partly illusion, since much of the book covers 16-bit Delphi. This is a multi-author title aimed at those already competent with Delphi and attempts to cover every aspect of the package, making it a mixed bag. There are good chapters on debugging, component writing and the Windows API, along with skimpy coverage of the Borland Database Engine, ReportSmith, and issues specific to 32-bit Delphi. It would have been better to focus exclusively on Delphi 2.0 and cover fewer issues in greater depth. Nevertheless, the authors are knowledgeable and most Delphi developers will find plenty of valuable tips here.

● Charles Petzold's *Programming Windows 95* is a major new edition of a book revered by developers for its clear description of how Windows hangs together. The emphasis is on understanding Windows internals, starting with the creation and control of windows themselves and going on to include text and graphics, resources, memory management, input devices and dynamic link libraries. There are brand new chapters on the user interface, multitasking and multithreading and OLE, two of which are by co-author, Paul Yao. Given the huge complexity of Windows, Petzold is remarkably clear and concise. There is nothing here about Microsoft Foundation Classes, Visual Basic or Delphi, but simply an explanation of the Windows API with examples in C and occasionally C++. Highly recommended.

documentation for Delphi's multithreading support is some sketchy online help and one sample application. It is just another example of Delphi's rough-and-ready documentation, but is particularly disappointing given that this is unfamiliar territory for many developers. As it happens, Delphi's Visual Component Library includes a TThread object that simplifies multithreaded programming. What follows is a quick look at how it works.

Under Windows 95 and NT, each 32-bit running application is described as a "process" and has its own space in memory. A thread is an execution path within a process, sharing its memory but able to execute independently, with processor time allocated by the operating system. This means you can create applications which are more responsive, performing lengthy background tasks while remaining available to the user. Unfortunately, multithreading makes program design even more difficult and introduces new possibilities for bugs and conflicts: that is no reason to ignore threads, but it does suggest caution.

The example application is designed to cycle through 140,000 colour combinations, displaying the results in a panel control. Real-world applications would not do this, but might be rendering an image or downloading a file from the Internet, to name two common background tasks.

In order to spin this off as a separate thread, we derive a new thread class from TThread, declared as follows:

```
TPCWThread = class(TThread)
  private
    iRed: integer;
    iGreen: integer;
    iBlue: integer;
    thispanel: TPanel;
  protected
  constructor Create(panel: TPanel);
  procedure Execute; override;
  procedure UpdateColour;
  end;
```

All classes based on TThread must override the Execute method as this is the procedure which runs when the thread object is created. If you create the new thread class by choosing Thread Object from Delphi's object repository, the skeleton declaration will do this for you.

Keeping in step

The essence of multithreading is that at any time the operating system may switch processing time between one thread and another. This is no problem if the threads are truly independent, but what if they interact?

For example, TPCWThread needs to update a panel on a form. Other threads, including the main application thread, also have every right to update that panel. This is the reason for the warning comment that appears when you create a new Thread Object: "Important: Methods and properties of objects in VCL can only be used in a method called using Synchronize."

"Synchronize" is a TThread method which performs a vital function, letting you safely call VCL components such as Delphi forms and controls without conflicts. Synchronize takes a method name as its parameter.

In this example, there is an UpdateColour procedure which updates the panel, called from the main Execute method via Synchronize.

Calling the thread

When the user clicks the "Start a thread" button, the following code executes:

Parent problems

Chris John is contemplating a move to Visual Basic 4. He asks: "I have been thinking of upgrading from VB 3 to VB 4 but have been concerned about the problems of converting existing applications. I have written to Microsoft which has given me some comfort regarding conversion, but the company was rather non-specific when referring to API calls. Your reference to the API call SetWindowPos [in the April issue] has encouraged me. However, I have also used the call:

```
Declare Function SetParent% Lib "User" (ByVal H%, ByVal J%)
```

to enable me to add and remove member frames to, or from, an array of frames together with their contents (other control arrays) at runtime. Can you tell me what modifications to this call might be needed, or does version 4 provide for the addition of members to an array of frames together with their contents, which would do away with the need for an API call?"

Visual Basic 3.0 code should run fine in VB 4.0 16-bit version, but the move to 32-bits is problematic. For a start, VBX add-ons are not supported and although OCX versions are generally available, the transition is not always smooth.

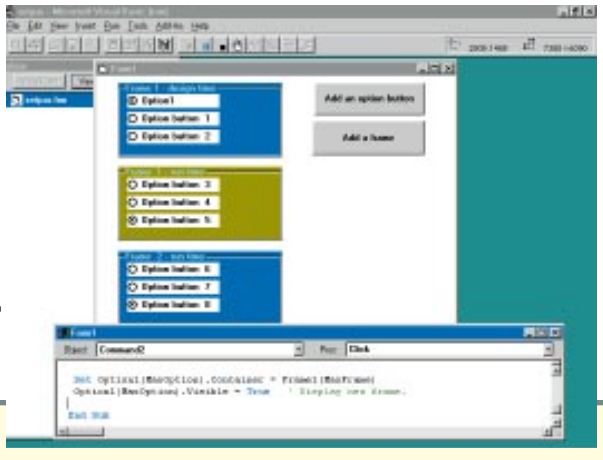
Next, although most API functions have a 32-bit equivalent, it is a different API and the declarations need changing. VB 4.0 comes with an API text viewer applet that lets you copy the declarations you need. In this case, the new declaration is:

```
Declare Function SetParent Lib "user32" (ByVal hWndChild
As Long, ByVal hWndNewParent As Long) As Long
```

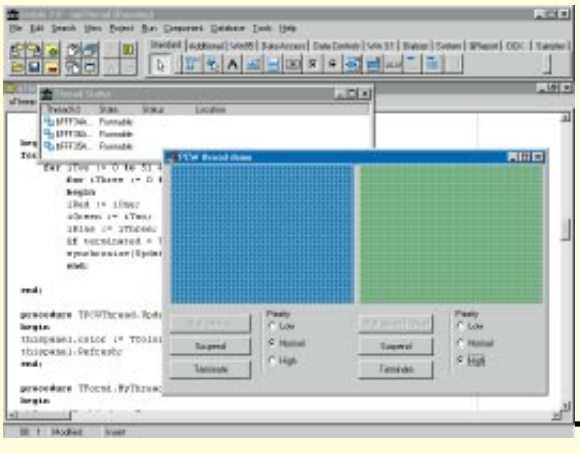
but the good news is that you probably don't need it.

In VB 3.0, although you can add new container controls like frames or picture boxes at runtime through a control array, the only way to add child controls to the new container is through the SetParent API call. VB 4.0 controls have a new Container property that overcomes the problem. For example, if you loaded a new frame at runtime, you could add an option button to it like this:

```
Load Option1(OptionIndex)
Set Option1(OptionIndex).Container = Frame1(FrameIndex)
Option1(OptionIndex).Visible = True   ' Display new button
```



This application shows how a control's Container property is used to add option buttons to a frame at runtime



You can check on Threads in a Delphi 2.0 application by showing the Thread Status window. In this demonstration, three are running, one for the main application thread and two TPCWThread objects. The user can control the priority of each thread while it is running. A thread can also be suspended or terminated

```
procedure TForm1.cbStart1Click(Sender: TObject);
begin
cbStart1.Enabled := False;
MyThread:= TPCWThread.create(Panel1);
Mythread.FreeOnTerminate := true;
Mythread.Priority := tpNormal;
rbNormal1.Checked := True;
Mythread.OnTerminate := MyThreadTerminate;
end;
```

To avoid creating two MyThread objects, the first line of code disables the button. Next, the thread object is created with the display panel passed to the constructor. The FreeOnTerminate property is set to true, which means the thread object is automatically destroyed when the thread stops running. Then, one of seven priority values is assigned, controlling how large a slice of processor action the thread receives. A corresponding radio button is checked.

Finally, a procedure is assigned to the Terminate event, so that the application can take appropriate action when the thread finishes its work. In this case, all the OnTerminate procedure has to do is re-enable the button.

There is no space here to print all the code but it can be found on our free, cover-mounted CD-ROM together with a compiled executable that anyone can run.

The finished application enables two TPCWThread objects to run side by side. Even with both running, the program remains responsive: the user can resize the window or move it around the screen. Each thread can be suspended and resumed, or heartlessly terminated before it finishes its task. The user can also control the priority that Windows gives to each thread.

All these are great benefits for certain types of application but this does not make it easy, so for serious multithreaded work, developers will need to look well beyond Delphi's sparse manuals.

PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted at the usual *PCW* address, or at **freer@cix.compulink.co.uk** or **http://www.compulink.co.uk/~tim-anderson/**

Visual C++ 4.1 and the **Solutions Development Kit CD** are available as part of a Microsoft subscription. The **Solutions Development Kit** will also be sold separately, price not yet available. Phone **0800 960279**

Books
All books available from **Computer Manuals 0121 706 6000** (prices incl VAT).
The Revolutionary Guide to Delphi 2 (Wrox Press). Book and CD £46.99
Programming Windows 95 (Microsoft Press). Book and CD £46.99

Some **do**, some **don't**

Stephen Rodda takes the Executive approach to fragmentation and defragmentation, and tries to quell some concerned response to a schools networking query.

Some file systems fragment; some don't. When I first started using a defragmentation utility it was done in the foreground and took about a minute to run. This, of course, was *COMPACT and it was on the BBC Micro. No wonder it took only one minute. All it had to do was to move less than 200Kb of data on a floppy disk. Nowadays, with very much larger hard disks, the spectre of disk fragmentation and defragmentation utilities rears its ugly head.

Do I need to defragment? The answer to this question depends very much upon the operating system and how it is used.

Novell maintains that with the random access nature of any file server (since many users are likely to be demanding different data and files at the same time) defragmentation of a NetWare server is not necessary. Of course, we all know what advantages are to be gained by defragmentation of a DOS FAT or HFS (Macintosh) drive using either the proper utilities or by backing up all files, deleting them and then restoring them. Now the jury appears still to be out under NTFS. Either we look at the network as a whole (in the case of a file server) or we consider just the user who has the computer as a desktop machine. Of course, NTFS becomes fragmented and there is a utility for measuring this from Executive Software at http://www.execsoft.com. I found that it was impossible to contact the Web site and opted for the download from CiX instead.

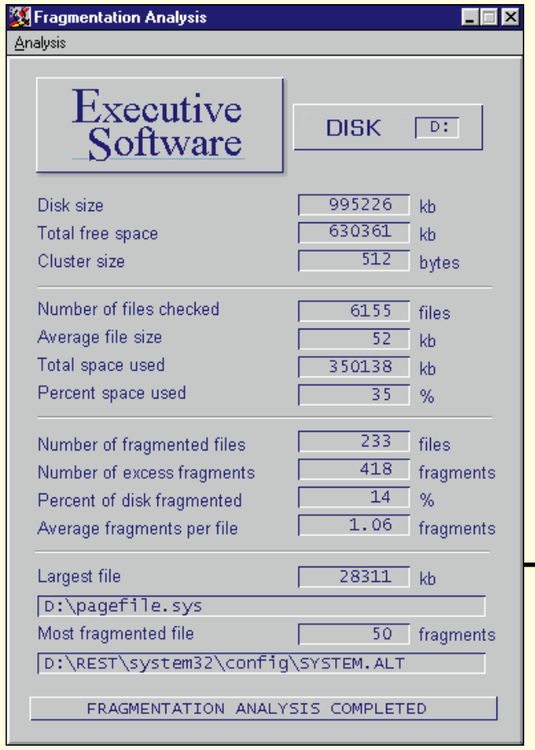


Fig 1 *Fragmentation Analysis Utility from Executive Software, showing fragmentation on my NTFS disk*

The company additionally supplies a file defragmentation utility for NTFS, but it appears that this requires constant upgrading between service packs. It has also been alleged that this firm is associated with the Church of Scientology. I downloaded the file and ran it on my NT setup. Look at *Fig 1* to see what it found.

I put the results down to the fact that I have restored the system to a clean disk, as I wrote last month, and this together with the fact that most of the data itself resides on the file server, means that my NTFS machine's hard disk doesn't change very much and therefore doesn't get fragmented. I must say that after restoring the whole contents of the hard disk, disk operations seemed to run at breakneck pace, and since the hard disk was exactly the same model this is probably the reason — I'm sure the access time of the hard disk won't have changed.

I still feel, however, that whether a file server is running NetWare or Windows NT, or anything else as a file service platform, the fragmentation is less important than that of a workstation type of machine. The reason is that given by Novell, and what with elevator seeks and so on (where disk requests are sorted into sequential requests depending upon the address of the sector on the hard disk required, so that the heads don't thrash), the impact upon data transfer speeds through fragmentation should not be an issue.

Network platform integration

Doing my usual check on the various versions of software which have come lately to the market, I am still amazed that PageMaker 6, although reasonably true to the format of the document used, still doesn't store PC and Macintosh files in a common format. I like to keep tabs on inter-platform compatibility and of course this is one of the things I wanted to check out. PageMaker 6 must still make a copy of the document when converting between platforms. *Fig 3* shows that the open original radio button is greyed out and that the only choice here is to open a copy of the original document.

On the same sort of subject, I notice that NT Server's automatic conversion from Macintosh to PC format and back again has been disabled for Windows 95 clients. When a Macintosh user saved a Microsoft Word file as, say, "Letter to Fred Bloggs and Co 31-5-96" to a Macintosh share on NT Server, a Windows 3.x client would see the document as something like "Letter~1.doc" and Word would be able to open the document quite happily from a double-click on the document. Under Windows 95 as a client, the document's name appears as "Letter to Fred Bloggs and Co 31-5-96", but without the extension, so it's a case of guessing which program created it. The only solution I can currently see is to persuade the Macintosh users (and this isn't easy, considering they've all had total filename freedom) to use the DOS extension convention and to save, say, PageMaker publications as .PM6, XPress documents as .QXD, Word documents as .DOC and so on. I hope Microsoft sorts this thing out in due course.

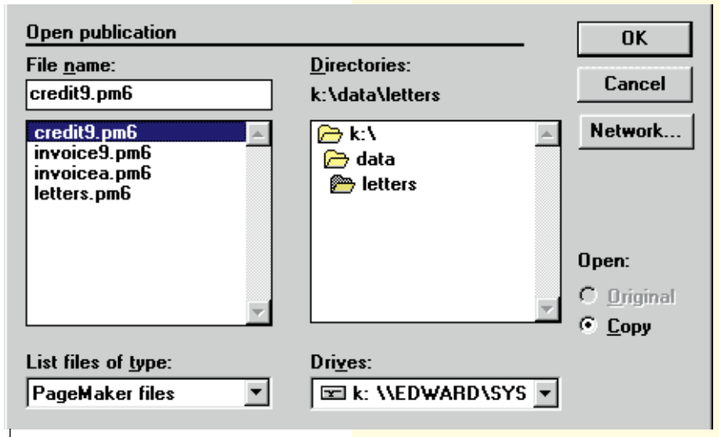


Fig 3 *Pagemaker 6's file open dialogue box showing the "Original" radio button greyed out*

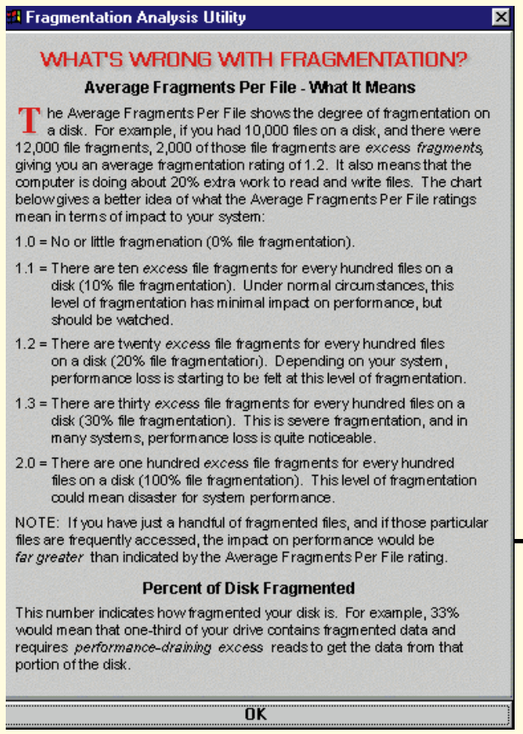


Fig 2 *This screenshot of the help file for the fragmentation utility explains the analysis in* Fig 1

Other schools of thought about networking

My reply to Stuart Davies in the May issue seems to have stirred up a hornets' nest. Here are some of the letters which I have received:

"I read your article addressing Stuart Davies' school networking query in the May PCW *with interest. However, I was a little uncertain regarding one aspect of it. I note that a 486DX100-equipped machine can outperform a low-end Pentium, and that a better processor than a P5-75 would be appropriate for the Win NT Server. However, I was not certain whether you were suggesting that Win NT Workstation would run satisfactorily on a 486DX100 equipped with 8Mb of RAM, or whether it should be a P5-75 or better processor.*

I have always assumed from what I have read that one ought to use a reasonably fast Pentium with Win NT Workstation in order to obtain adequate performance from it; e.g. a P5-90 or better with at least 16Mb, if not 32Mb, the specification increasing according to the applications one intends to run.

By the way, I am examining the best way forward for my own organisation, which will have a full complement of four staff, but using high-end systems in part."

David Priestley

Thank you for your comment. The suggestion that I made for the NT server — that a high-end 486 (such as a 486DX-100) will outperform a lower specified Pentium (such as a P75) — also holds good for the workstations. With the current availability of DX4-120 chips at reasonable prices, I feel that from a performance point of view it would, as you rightly suggest, not be a good idea to use a Pentium running slower than around 90MHz; so, yes, unless you're using code specifically optimised for the Pentium, stick with the 486 until Pentium prices come down — they will, especially with clone chip makers like AMD and Cyrix entering the fray.

We are also looking at educational machines, not at production machines. The reason I suggested NT Workstation is that, in my experience, NT outperforms Windows 95, and that running a single

application (or two at a pinch) would not overtax the machine.

Of course, in a working environment, these machines would indeed benefit from more memory, but lessons tend to advance at a more relaxed pace than a working environment and therefore a small speed trade-off, rather than embroiling the school in a full lease contract, would be acceptable.

"After reading your column in May PCW*, I think you are the one to ask concerning Windows 95 networking. I have two questions:*
1. I have a quad-speed EIDE CD-ROM drive in one of my computers. I can share this drive, and map a network drive to it. But how do I make Windows 95 think that this is a CD-ROM drive and not just a network drive? By tricking Windows 95 into thinking that it is a CD-ROM drive, I can achieve the following:
a) playing audio CDs on a remote computer; and
b) using applications that require MSCDEX, such as most CD-ROM games.
2. When I click on the 'Access Control' tab from Network in the Control Panel, I can see that there is an option for 'User Level Control'. What is this? I can't find any reference to how to set up this facility.

Do I need Windows NT? (All my machines use 'Client for Microsoft Networks' from Windows 95) — I have heard that this will allow me to choose which users can access which shared resources, as opposed to giving a resource a password."

Paul Oakham
101731.2345@compuserve.com

The first problem is that, as far as I am aware, (1a) is not possible without a remote control package. You could then, using something like Carbon Copy for Windows 95, get the machine to play an audio CD simply by taking control of it from the remote machine. On the other hand, an audio CD should play automatically when inserted, but if you particularly like the CD, I suppose you could get the remote machine to play it again (and again) with a remote control package.

Not being a particular games player (I get enough excitement playing with hardware on my machines), I'm afraid I don't really understand the requirement. Is it that the games software actually requires the MSCDEX in order to fool it that there's a CD loaded before it will run over a network connection? If so, then you'll have to pester the manufacturers. It's more likely that the game hits the MSCDEX extension directly, rather than bothering with niceties such as DOS's own filing system, so you'll probably be in the same boat even if you *do* manage to load MSCDEX anyway.

The user level control you mention in the networking control panel in section (2) of your letter is available only to Novell NetWare clients, and requires a NetWare server to be installed on the network. This server does all the user validation required. The only ways to achieve this are either by setting up a NetWare server or by running Windows NT as you suggest.

"I've just read your reply to the perplexed school computer manager in May's PCW*. I must say, that while I normally respect your magazine's advice and bow to you as a network expert, I sincerely hope the poor guy doesn't take your advice.*

Educational networks are a slightly different breed from your standard business setup and they operate in significantly different ways. Firstly, you have far more users than machines. In my own school there are over a thousand users and a network of 50 machines. You can't expect (as you would in a business) that because Sally is using the computer in that office today, she'll be using the only one using it. The system has to be set up so that PCs are user-independent. In my own school, everyone has their own area on the hard disk and these areas are secure from other users; students can log on to the system at any point in the school and get to their own (password protected) area.

Secondly, in business, security against users is not a huge concern. But in schools, if your system is not completely tamper-proof, some eager beaver will be rooting around in system areas or, even worse, trying deliberately to bring the whole thing down for a laugh. Alternatively, they will use the system to play lots of games and this is not really what it was bought for, was it?

Thirdly, when I describe myself as a network manager, this is by way of a secondary description: I spend most of my time teaching — this is what the school pays me for. Network management has to take about one or two hours a week at most and therefore I place a high value on the support I get from my supplier. I haven't got time to take apart all my 286s, insert new boards and set up a network all on my own — not if I want to stay sane. Most school network managers feel the same because schools are so pushed for cash these days they can't afford to employ people who spend all their days tinkering with the kit.

Lastly, schools have no capital — they are in effect given running expenses each year. In good times they can save out of these running expenses to finance big purchases but you must have noticed that these are not good times for schools.

Teachers are being made redundant, and experienced teachers are being pushed into early retirement (newly qualified teachers are cheaper) because there is no spare cash. That's why many schools are having to go towards leasing if they want reasonable kit."

Phil Hardcastle

Thank you for your interest. I note your points and would like to defend my suggestions.

The first aspect you mention is "hot-desking", which basically is the industry term for having fewer computers and desks than computer users. The thing with Microsoft Windows 95 and, indeed, with NT is that each user will have their own area on the file server in which to store files — naturally. This is what file servers are all about. Indeed, NT and Windows 95 specifically allow separate desktops to be stored for *each user* so this will allow hot-desking with no problem. Furthermore, NT has even better support: one's desktop will follow one through a whole organisation over any number of NT machines.

Your second point makes differences between the security needed by a business and an educational site. The thing about business is that in some concerns, as you suggest, security may not be an issue but I think you are over-exaggerating a school's need for security as opposed to that of a large organisation. At any one time there must be thousands of confidential documents stored on a large business's file server to which the management would not want just any member of the company to have access. Security is therefore paramount, and only by having either knowledge of an administrative login and password, or direct and unsupervised access to the file server, could anyone break into the system. This naturally follows for schools as well as for the corporate sector, as does unauthorised access to the system areas.

Apart from some specially-designed front-end to Novell NetWare I can conceive of nothing which would make the administration of a file server as easy as that which is already built in to NT Server. Believe me, file servers are as impregnable to attack as the computer room or their passwords. It's as easy as that; you need no specially-crafted software nor hardware to secure an NT (or, come to that, a NetWare) file server.

Thirdly, server administration is not a wholly automatic process. You have to change backup tapes and so on, and to purge outdated files. At the end of an academic year, you will have to remove the logins and files of those who have left the school or college, and at the beginning of each academic year you will have to generate new accounts for that year's intake. Adding a network card to a machine is a trivial matter in comparison, best carried out during the holidays, perhaps with help from a computer-literate parent or two. The somewhat extreme reference you make to "spend(ing) all their days tinkering with the kit" is, of course, a knee-jerk reaction. Once a network adaptor or motherboard is installed, it stays there. I concede that you can always find people who will willingly fit this model, but now that we have left the pioneering days behind, computers are serious business machines with hardware stability to match and this sort of involvement is neither desirable nor necessary.

My reasoning behind the advice not to lease is that I felt the upgrade to the equipment could be financed out of what would, in effect, have been one year's leasing fees. To this effect, no new money would have needed to have been found — what they were probably prepared to pay in leasing in the first year would almost definitely have provided the upgrades required for that year. Remember that leasing can be the financial equivalent of trying to fill the bath with the plug out.

PCW Contacts

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It's the **business**

Chris Cain finds the answers to some common problems with running Microsoft Office on Macs. There's bumps, raves and sprockets, too.

While Microsoft is often seen as the baddie of the Mac world, in reality, almost everyone prefers to use its software. Despite the fact that Apple bundles the integrated suite ClarisWorks with its Performas, Word is the most popular Mac word processor with over 3.6 million units sold. Excel is also up there in the high numbers, and many businesses with both PCs and Macs have standardised on Microsoft Office.

On the opposite page we take a look at the top ten support questions regarding Microsoft Office. If you can't get Excel to load or are having trouble with Word file formats, then this is for you.

Bumps bounce prices

Apple is set to release its "Speed Bump" PowerMacs, officially known as the 7600 and the 8200.

The former is a 120MHz 604-based desktop model in the same case as the 7500, while the more impressive-sounding 8200 is a mini-tower based on either a 100MHz or a 120MHz 601. Both machines have all the usual Mac goodies and the 7600 comes with a 256Kb second-level cache as standard.

The launch of these machines has brought PowerMac prices down and the range now starts with the 7200/90/8/500/CD at a street price of around £1,150. An 8200/100/1.2Gb/CD will go for £1,500 and a 7600/120/16/1.2/CD for £1,875. All prices exclude VAT.

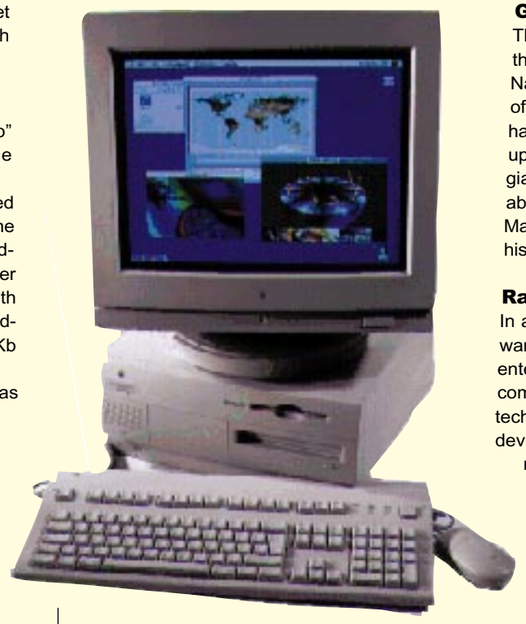
Card sharp

Apple has announced two new DOS compatibility cards for PCI systems, which should fit into any current PCI model. They feature a choice of either a 100MHz Intel Pentium or another "586"-class processor.

The Pentium version is a 12in card with 256Kb of secondary cache, 8Mb of RAM expandable to 72Mb and SoundBlaster 16 compatibility. It supports networking via Ethernet and both VGA and SVGA video displays, driven by 1Mb of VRAM and an ATI Mach64 graphics controller.

The 586 version will be slightly cheaper and is a 7in card with 128Kb of second-level cache, a maximum of 64Mb of RAM and 1Mb of non-expandable DRAM or video. Both boards will run DOS, Windows 3.1, 3.11 and Windows 95, and come with System 7.5.3 and MSDOS 6.22.

I'll be writing more about these products when I get my hands on them.



New "Speed Bump" PowerMacs boast even better performance

Goodbye, David

The down side of the Mac news this month is that Dr David Nagel, Apple veteran and head of the R&D Labs in Cupertino, has resigned from Apple to head up a division at communications giant AT&T. David was a likeable, prominent figure on the Mac scene and I for one will miss his evangelistic presentations.

Rave on

In a bid to carry PowerMacs forward in the 3D graphics and entertainment arenas, Apple has come up with two new software technologies designed to give developers the flexibility they need and get maximum performance form the hardware without breaking the rules laid down in the operating system. The first new arrival is QuickDraw 3D Renderer Acceleration Virtual Engine, or RAVE.

According to Apple, this is a software

Microsoft Office sort-out: the top ten support questions... and answers

Designed for both 68K and PowerPC machines, Microsoft Office is the standard business office suite for the Macintosh. The current version, 4.2.1, is bigger and better than ever before but sometimes it just doesn't want to work the way you do. Thanks to Microsoft's Mac software support team I've got the answers to the top ten most commonly asked technical support questions. If you're having problems with Office, read on.

Q When I open Excel I get the message "Cannot find English Lexicon" and the program fails to load. How can I fix this?

Having made sure that the Excel icon is in the Excel 5.0 folder, the first step is to rebuild the desktop by holding down the Command and Option keys on startup until prompted to Rebuild. Answer yes and then try to run Excel. If the Lexicon message still appears, remove the Registration Database and Embedding Preferences from the Preferences Folder and try again. If it works, then the program will create new preferences and the old file can be deleted.

If this doesn't work, ensure that Virtual Memory is switched on in the Memory Control Panel and restart. Finally, try running the program after booting with a clean system disk.

Q PowerPoint gives me the message "The Server Application or Source File cannot be found". Why?

This can happen when inserting an object from the Insert menu. To fix it, first make sure that the Shared Code Folder and Shared Code Manager are in your Extensions folder and that the Microsoft Folder has not been moved from its original position (it's normally installed on the root directory of your hard disk). Next, double-click on the ClipArt gallery application in the Microsoft folder in an attempt to re-register it.

If this doesn't help, there are three more steps you can try. First, try increasing the program's preferred memory size in its Get Info box. Next, check for an extension conflict by turning off all other extensions except those required to run Office. Finally, try removing and re-installing the ClipArt Gallery and files using the Office Setup program.

Q I'm running System 7.5.2 and now that I've installed Office my Mac won't Shut Down. Why should this be?

There is a known conflict between System 7.5.2 and version 4.2.1 of the Microsoft Office Manager (MOM). A free patch called Office Manager 4.2.1b will fix this. The only other workaround is to use the applications without the MOM Control Panel.

Q Why do I keep getting an Error 11 in all the Office applications?

Error 11 can crop up when running Office on a PowerMac, usually in Word and Excel. To fix this, you need to place a patch called Office 4.2.x PowerMacintosh Update into your Extensions folder.

Q Is there a way to increase the number of Import/Export file options in Word 6?

Yes. A supplemental converter kit is available from Microsoft Product Support Services.

Q How can I open a file created in Word 6 with Word 5?

A supplemental converter is available that lets you open both Mac and PC Word 6 files in Word 5. The converter is installed by dropping it onto the Word Commands folder in the main Microsoft Word folder.

Q When I bring ClipArt into PowerPoint via the ClipArt Gallery, a grey box is displayed instead of the image. Can I fix this?

Yes. This problem occurs on PowerPC 603 machines and a temporary workaround is to go to the Memory control panel and turn off the Modern Memory Manager, then restart. This isn't an ideal situation, but it works.

Q When I launch PowerPoint I get the message "Please Locate the Speller". Why?

This usually occurs when the PowerPoint preferences file is damaged, and there are two ways you can try to fix it:

Fix method 1: Drag the file Microsoft PowerPoint Settings (4) to the wastebasket, run Office Setup in maintenance mode and choose Add/Remove. Under installed components click the option triangle for PowerPoint. Leave the PowerPoint option on the second level selected and click the following options to clear them: Presentation Translators, Help, Quick Preview, Templates, Genigraphics Drivers, Clip Art Files. Under Installed Components, click the option triangle for Tools. Leave the spelling option selected but click the other four options to clear them: Microsoft System Information, Setup, Fonts and Shared Resources. Now Click continue and then OK. After the program finishes its business run Setup again, choose Add/Remove and select Microsoft PowerPoint and Tools. Click Continue and then OK.

Fix method 2: If you can select the UK English Dictionary but cannot spell-check your document, reset the spelling checker locations in the following way. Drag the Microsoft PowerPoint Settings (4) file to the Wastebasket and empty it. Start PowerPoint and on the Tools Menu click Spelling. When the dialogue box appears, click MS spelling and then UK English Dictionary. If you're still having problems remove all installed components and re-install Office.

Q When I try to load Excel I get the message "OLE2 cannot be found" or "Visual Basic Apps Lib Cannot Be Found". Everything is installed so what's the problem?

Both of these errors occur on a PowerMac when virtual memory is switched off. Due to the way in which PowerMac code is written, with VM turned off the entire code base for Excel must be loaded into memory in order to run it. So you must have enough free memory available.

With VM turned on, the Mac becomes more flexible and the PowerPC can load its programs in component chunks when they are needed. The amount of memory required to run the software is drastically reduced. Unfortunately, using VM with System 7.5.2 has quite a performance hit and a better solution in some cases is to use a third-party product such as Connectix RAM Doubler. This flips the component switch and uses data compression rather than swapping files to hard disk.

Q I have to use virtual memory to load Excel but the application startup time is ridiculous. Is there a way to speed things up?

Yes. Installing Apple's System 7.5 Update 2.0 will take your system software to version 7.5.3 and significantly speed up launch times when using VM.

If you were having trouble with Office, then hopefully one of these solutions will have cured the problem. Special thanks to Janine and colleagues at the Microsoft Mac Support Team who can be contacted during office hours at the numbers given in our Contacts panel, page 328).

layer designed to support the low-level rasterisation operations required for interactive 3D rendering. In other words, it's a low-level 3D driver that works in a similar way to traditional 2D APIs except that it provides support for Z buffering, used to perform hidden surface removal; double buffering, to conceal the flashing that occurs when images are drawn and redrawn on screen, and to decrease those awful tearing artefacts as seen in Doom2; and texture mapping.

RAVE is aimed primarily at specialist application vendors (i.e. games and entertainment developers) and at third-party hardware manufacturers who can produce 3D accelerators. It doesn't replace Apple's existing QuickDraw 3D technology; rather, it works with it to accelerate applications.

Sprockets abound

Apple's other new technology is Apple Game Sprockets, a series of developer tools designed specifically for game creators. The set comprises DrawSprocket, for 2D graphics routines and buffering; SoundSprocket, for 3D location-based sound; NetSprocket, for developing multi-user titles; SpeechSprocket, for user-independent voice recognition; and InputSprocket, for controlling joysticks and other input devices.

QuickDraw 3D RAVE is a spin-off of the new Sprockets.

Just how good any of these tools are remains to be seen. Whether developers will start to take Mac game development seriously is another matter, but rest assured that as soon as the first Sprocket-assisted title appears I'll bring you a full report. Plus, I'll be checking out both these developments in greater detail in a future column.

Utility of the Month: Fat Cursors

Catch that cursor! Why give yourself a hard time trying to find the standard cursors on your screen when you could have a nice fat arrow and a big broad I-beam? It's useful enough on a standard Mac screen but could also make PowerBook users' lives a lot easier. The documentation claims that Fat Cursors v1.2.1 works with just about all applications, even those that install their own cursors.

It installs simply and displays its icon at startup. With the set of buttons provided, you can switch from fat to standard cursors whenever the fancy takes you. Tthere are "Fat" Keys and "Find" Keys options — you use the former to enable or disenable the fattened cursor while selected modifier keys are pressed. "Find Keys" can be used to select modifier keys to enable (or disenable) the "find cursor" function: when invoked, a large circle will flash around the cursor's present location.

Fat Cursors is shareware. It costs $10 to register and can be downloaded from Scott's Place which has some useful Mac shareware (some of which has been written especially for disabled computer users): http://www.ecnet.net/users/gnorris/place.shtml

Patrick Ramus

Mac's best friend

There's a wonderful little program I've been playing with, called Dogz. "Dogz — your computer pet" is a hilarious piece of software that gives you your own virtual dog on the Mac.

You start by adopting one of five puppies, each a different breed with its own characteristics. You train your puppy using various toys and treats, and watch it grow into a fully-fledged pooch.

The things you can do with your dog include playing fetch with a ball, teaching him tricks, and indulging in a bit of tug-of-war with an old shoe. You also have the option of making him into a Guard Dog screensaver when you're not at the keyboard.

Totally useless but tremendous fun, Dogz is a must for all mad Mac owners.

Woof! Dogz gives you your own virtual dog on the desktop

PCW Contacts

Chris Cain loves to hear from Mac users and can be contacted via the usual *PCW* address or on email as **chris_cain@pcw.ccmail.compuserve.com** or **CainUK@AOL.com** or **chris@cix.compulink.co.uk.**

Apple Computers 0181 569 1199
Apple's home pages are **www.apple.com** and **www.euro.apple.com**

Microsoft's Mac Software Support Team 01734 271580; Fax 01734 271974
Microsoft 01734 271676;
Web **www.microsoft.com**

Dogz is £14.99 from Mindscape 01444 246333

Any **questions**?

If you have a PC problem or think you could help out other readers, contact Frank Leonhardt.

Q "I am currently using three PCs in a limited space (each of which is constantly being accessed by modem) and would like to ditch two of the monitors and keyboards and access all three machines via a single monitor and keyboard connected by a 'box of tricks' to all three machines.

For 'political' reasons I am unable to network the machines and hence I wondered if you knew of any products which would be of use to me?"
Paul Starling

What you ask sounds relatively simple, a three-way switch, but there are problems which make it rather more expensive than you may have expected. While switching the video signal between monitors is easy enough, assuming you're not using a fancy "green" monitor which turns itself off, keyboards are a lot more stroppy. There is a fairly constant two-way conversation taking place between the PC keyboard controller and the processor in the keyboard. If this gets interrupted then both the PC and the keyboard are prone to becoming confused.

A keyboard switch has to pretend to all the connected PCs that they are constantly talking to their own keyboard and convince the keyboard that it is always talking to the same PC. This rules out the possibility of a simple and inexpensive manual switch.

Although you didn't mention a mouse, these are just as much trouble as the keyboards. If you can stand having three keyboards and possibly three mice but just one monitor, then the cheapest solution is a simple video switch. If you want to switch more, you'd better check your bank balance.

There is actually a software solution to this problem which doesn't involve remote control over a network. MARC (Multi-Access Remote Control) is a package which successfully allows one PC to control many others using simple serial connections as well as a network. It has the added advantage that you can see a shrunken display of all the PCs you are controlling on-screen at once.

Which controller? What memory?

"I am currently using a 386DX system upgraded with a Cyrix DRX2-66 processor. It is equipped with 8Mb of RAM, a SoundBlaster CD-ROM player (2x speed) and a Quantum LPS420AT IDE HDD (420Mb). I use OS/2 Warp and Lotus SmartSuite for OS/2.

I have two questions. Firstly, my HDD transfer rate is currently rather slow (<800Kb). I am planning to purchase an EIDE controller: are my current CD-ROM player and HDD compatible with an EIDE controller? If this is the case, can you suggest which one (brand/type)?

Secondly, my motherboard can only take 8Mb on-board and for an additional 8Mb I have to use a proprietary memory board. But I have read that my board will accept any 16-bit memory expansion board and this is what I plan to purchase. Do you know of a 'good' 16-bit memory board which can take 8Mb of RAM and is compatible with OS/2 Warp?"
BL Halim

EIDE adaptors added to existing machines often seem to cause trouble, except when they are being added solely for a CD-ROM drive. That being said, your existing hard disk (and a second unit, should you choose to add one) should work without problems.

From your description, I suspect you have a Creative Labs CR-563 CD-ROM drive. These have a Panasonic rather than an IDE interface, although the 40-way cable is the same. There should be no conflict between either the sound card or special interface board you are currently using to attach the CD-ROM.

As for the memory question, although memory boards were popular in earlier years, processor speeds have greatly outstripped the fixed expansion bus performance and have created an unacceptable bottleneck.

Apart from upgrading PS/2 machines with a micro-channel (which is faster and allows wider addressing) I don't know of anyone still making such boards. Unless any readers know differently?

Pushing the file limits in DOS

"I need to develop a DOS application which must have about 100 files open at the same time. DOS states a maximum of about 255 but I have written a few programs (C++, QBasic) which all fail at around 20. I have fiddled with CONFIG.SYS and even played around with the standard C header files, but with no success. Is there a (relatively) easy method of overcoming this 20-file limit under DOS?"
Chris Fellows

I take it you have already tried increasing the limit in CONFIG.SYS using the FILES= entry? If you set FILES=30 you have the chance to open a maximum of 30 files at any one time, and so on. I suspect you may be having trouble with the stdio libraries which came with your "C" compiler. These often have an internal limit imposed on the array of file handles. It can sometimes be determined by looking at the manifest constant FOPEN_MAX in stdio.h.

To increase the limit, you can often adjust the symbol definition and recompile the libraries. Alternatively, the array can sometimes be dynamically allocated at run-time — consult your compiler documentation or, more reliably, have a good rummage through the startup module source. The alternative is to design your software in a way which doesn't require so many open files in the first place — DOS isn't terribly efficient at juggling lots of open files!

Waking up to PC fax

"To take full advantage of Windows 95, I recently upgraded my motherboard to a 133MHz Pentium with 16Mb of RAM. I have also installed an external fax/modem connected to the serial port. The fax/modem runs from the same line as the phone with the equivalent of a splitter box to filter calls.

The computer has an energy-saving feature, as emblazoned by the BIOS at bootup, but I have not yet enabled this feature. According to the manual, the jumper switch can be enabled if I install an energy-saving switch on the front panel. The manual states: 'System will be wake up while the keyboard or mouse be touched' (*sic*). I understand that part, but it doesn't really apply in my case; what I would like to do is leave the computer switched on, and then 'wake up' if a fax comes through. Would this work? Failing that, if I switch off the monitor and leave the system running permanently, would that consume a lot of electricity?

As I live in Italy, power cuts are not exactly unknown: so if we have one, would there be any problem about the computer re-setting? Which .INI file would I need to install the Fax .EXE file to reload? I use Eclipse software, which was supplied with the Electronic Frontier Modem as recommended in your recent tests [February 96]. It seems to do a good job."

Nigel Hinton

Some machines can be programmed to "wake up" on receipt of a ringing signal from an external modem (pin 22 goes high in time with the ringing) but these are fairly rare. External boxes are available which use the ringing signal to turn on a mains socket into which you can plug your whole computer.

Although this sounds like a good idea, you are then left with the problem of getting the machine to turn off again: unless the fax software supports this feature, it's not easy. Then your caller has to wait for the machine to boot before it can start receiving faxes. These could be some of the reasons why these devices can no longer be found on the market.

Using the low-power mode of your PC is probably the best idea. The bulk of the power consumption normally goes on the monitor so having one of these, which turns itself off, would be a great asset. Next to this, the disks and the processor are the most power hungry — though small (in size) modern drives use only a fraction of what they used to.

The power consumed by a processor is proportional to its clock speed. Energy is used each time a transistor in the chip changes state, and the faster it is running the more switches occur. Turning down the processor speed is therefore a good idea if you can do it. Beware the "turbo" buttons, found on many motherboards, which actually turn down the bus speed and leave the processor running at full tilt. If you want to turn down the processor clock rate, a switch connected to the speed selection jumpers is often the only way.

You can leave the PC out of things and use a type of fax/modem which stores incoming faxes until the PC is turned back on. As you'd expect, these cost more and their storage capacity is necessarily limited, but for a small office they could be just the job.

Personally, I have always had a real fax machine for incoming transmissions — and a solid, reliable, commercial one at that (purchased second-hand). The beauty of fax should be that it is always available, quick and straightforward to use. Getting a PC in the way has got to be a step backwards.

To get programs to start automatically when you boot Windows 95, place them in the Start Up section of the Start menu. You can do this by placing them in the "Start Up" folder, which is usually found in the \Windows\Start Menu\Programs. If your system is set up to keep start menus separate for each user then yours will be in \Windows\Profiles\username\Start Menu\Programs, where "username" is your user name.

Frank's bargain basement

Things are looking interesting on the CPU front at present. You can always buy the latest, greatest Pentium from Intel, but for those on a budget, price/performance is more important.

So how do you get the most bangs per buck? My favourite, for quite a while now, has been the Pentium 75: I never liked the P-60/66, which ran at 5v rather than 3.3v and got rather too warm. A P-75 can be had for well under £100 now and they perform rather well.

All current Pentiums run at external speeds of 50, 60 or 66MHz. A P-75 actually runs externally at 50MHz, multiplying this internally by 1.5. The P-100 is actually the same chip, clocked externally at 66MHz. Faster Pentiums simply multiply the external clock by two or 2.5, ending up with a P200 multiplying up a 66MHz by three (so it is said).

Intel doesn't guarantee that a chip sold as a P-75 will run at 100MHz if you change the jumper on the motherboard, but plenty of people have done this for a long time now without problems and saved about £100 each. It may reduce the life of the CPU, so doing this is entirely at your own risk but who wants to keep the same processor forever?

You not only have Intel processors to choose from now: Cyrix and IBM are launching a 686 which fits into a Pentium socket (the Cyrix 585 is actually a souped-up 486). AMD is about to deliver something, too.

From what I've seen, the claims made for the 686 aren't justified. While some instructions are undoubtedly faster than a Pentium, floating-point performance doesn't look so good. In addition, the entry-level 686 runs at double the external clock rate rather than 1.5x like Intel's. This gives its internal instructions a boost but each time it goes out to the bus the advantage disappears. This isn't to say it's not a good chip — and when a .35 micron version is produced, it should be even better. Whether it gives a better bang-per-buck than a P-75 depends on its final selling price and this is not available at time of writing.

If there is an update to this it will appear first on the *Computer Answers* Web site (see the *Contacts* panel).

A P-75 chip, costing less than £100, runs rather well

PCW Contacts

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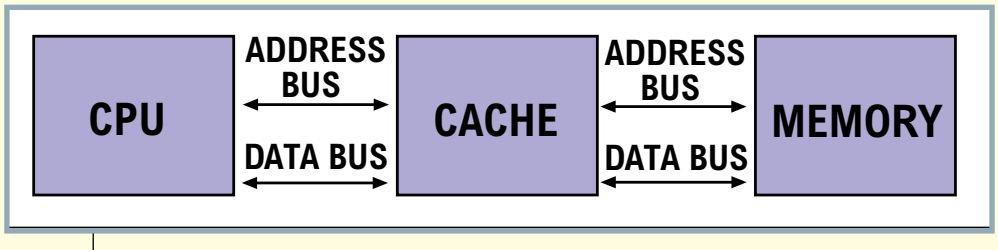
There is a *Computer Answers* Web site at **http://www.users.dircon.co.uk/~wombat/answers/** which may contain late-breaking news. Letters may be sent to *PCW* at **VNU House, 32-34 Broadwick Street, London W1A 2HG**. Sorry, but due to the high volume of correspondence, individual replies are not normally possible.

Hardware **basics**

Eleanor Turton-Hill looks under the bonnet to demistify and explain the workings of your PC's engine components.

Judging by some of the emails and letters I've been getting recently, there's still a fair amount of confusion out there when it comes to understanding hardware.

All computers have four basic elements: a processor, memory, storage devices and I/O devices. Understanding the relationship between these four units is an essential starting point if you're trying to get to grips with hardware, so here's an overview.



A "cache hit" occurs when data required by the CPU is found in the cache. Because the cache provides data at high speed, it can dramatically improve the performance of the whole system

CPU

One of the first things you'll hear people talking about is the type of processor in their machine. This is the central processing unit (CPU) and is the single most important component in the machine because it processes data and controls all other parts of the computer.

Even the simplest processor is an extremely complex device. I'm not going to go into great detail here, but it is useful to have an outline of its main functions.

If you take the lid off your computer you will see several flat, black, blocks stuck to a green board. The CPU is the big square one usually marked "Intel" but sometimes "Cyrix" or "AMD".

Essentially, what the processor does is to store, move and manipulate data. It can only do very simple things like move numbers from one place to another or perform very basic mathematical operations, but it does all of these things very fast.

The CPU works by continually retrieving instructions from memory that tell it where to get data, what operations to perform on the data and where to store the results. The particular instructions which the CPU is following at any one time are determined by the program it is running.

If I say that my computer is able to produce reports, what I mean is that it has a program which instructs the CPU to execute a particular group of instructions which create a report. If I say that my computer knows my friend's phone number, what I actually mean is that the number is stored on my PC's hard disk.

Often, the CPU performs several operations on the same data, or it may need to hold the result from one operation, to be used on the next. Such data needs to be stored somewhere close at hand so it is put into address registers and data registers on the CPU itself. This prevents the processor from having to access the memory every time it generates data.

RAM

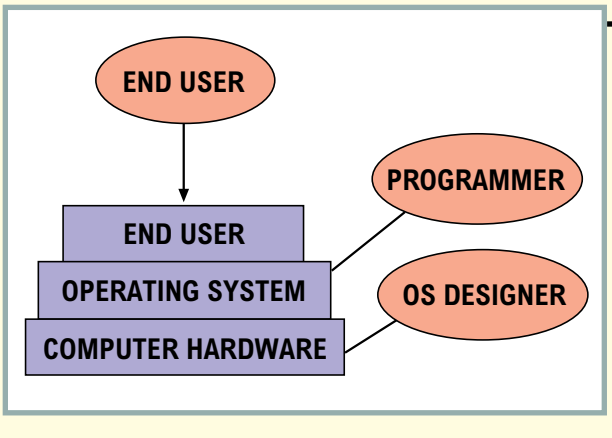
One of the concepts which confuses beginners is that of the location of data. The CPU spends its time fetching instructions and executing them according to what program is running. But where is the data? Is it in the hard disk?… the memory?… the cache? Well, the answer is that data is continually moved around. It's in different places depending on the particular stage of the CPU cycle.

The CPU can perform operations directly on data stored in its own registers, but it can also perform operations on the data in memory and on data stored on disks or tapes. But data on your hard disk or tape must first be brought into memory before the CPU can do anything with it.

RAM stands for Random Access Memory. It's the working memory used by your computer to store instructions and data before they can be committed to the hard disk. Because RAM works much faster than the hard disk, it's used for handling all the data which is in constant use while programs are running. The hard disk is used for dumping any data which the system does not currently need.

Cache

Modern computers have a very large amount of memory compared with the first



The hierarchical view of hardware can be extended to software. The ultimate aim of a computer is to provide a set of applications for the end-user. These applications are developed by the application programmer using a particular operating system (OS). The OS masks the details of the hardware from the programmer and provides the programmer with a convenient interface for using the system

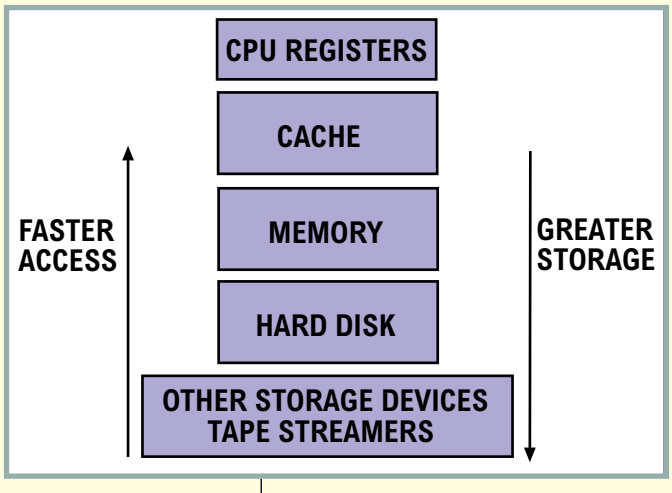
PCs of the early eighties and this has had an effect on the development of the PC's architecture.

Storing and retrieving data from a very large block of memory is more time consuming than from a small block. With a large amount of memory, the difference in time between a register access and a memory access is very great and an extra layer is required in the storage hierarchy.

A device called a cache sits in between the CPU's registers and main memory. This cache is much faster than main memory but slower than the CPU's registers. Its advantage is that it can hold more data than can be held in registers and can work faster than main memory.

When the CPU goes to read data from a certain address in memory for the first time, the cache goes to find it from memory. When it has retrieved the data, it records the address and data in its own fast memory. Eventually, the cache's memory fills up with records of addresses and data that the CPU has requested and when those same pieces of data are requested again, they are taken directly from the cache.

When the requested data happens to be in the cache, a "cache hit" is said to have occurred. Any requests which are made for data which is not already in the cache result in a "cache miss" and one of the records in the cache is then replaced.



In order to perform satisfactorily, the PC uses a hierarchy of memory/ storage technologies. As you go down the hierarchy, the cost per bit decreases. Thus the smaller, more expensive memories are supplemented by the larger, cheaper, slower ones

Hard disk

The hard disk is the part of your system which holds all the programs, documents and data when your PC is switched off.

The longer you have your computer and the more documents you create and the more data you store, the more valuable your hard disk becomes. In fact, hard disks which crack up can put small companies out of business in a flash. Your hard disk is the storage place for all your valuable work.

The programs which you run (i.e. your word processor, graphics package or spreadsheet) are replaceable. When you buy your PC, you'll often get some of this software pre-installed on the hard disk, but you'll also get a set of floppy disks which you can use to re-install it if anything goes wrong. Anything else which you create should be instantly backed up onto a spare floppy disk.

The hard disk inside your PC is made of aluminium alloy covered with a magnetic coating. This makes the disk itself a pretty rigid plate: hence the name "hard" disk. Hard disks are completely sealed inside the disk drive and are not removable like many other media. They also spin very fast and have high recording densities, which means that they must be kept free from dust and any other kind of environmental contamination if they are to be maintained properly.

Thankfully, for the user, most hard disks look pretty much the same and people rarely know much about their internal workings. Hard disks have changed radically over the years, especially in terms of capacity. The smallest hard disks held a tiny 5Mb while these days 8Gb is the maximum hard disk capacity. The average PC bought today has between 500Mb and 1Gb in hard disk storage.

Data is recorded onto the magnetic surface of the hard disk in exactly the same way as it is on floppies or digital tapes. If you've ever defragmented your hard disk, then you probably have some mental image of how the surface of the disk looks. Essentially, the surface of your hard disk is treated as an array of dot positions, each of which can be identified and set to a binary "1" or "0". The position of each array element is not identifiable in an "absolute" sense, and so a scheme of guidance marks helps the recorder find positions on the disk. The need for these guidance markings explains why disks have to be formatted before they can be used.

Hard disk speed

The speed of a hard disk can be measured in lots of different ways, and it is important to know exactly what figures are being quoted when you're shopping for a new one. The performance of your hard disk is very important to the overall speed of the system: a slow hard disk will hinder a fast processor like nothing else in your system can.

As an initial gauge, look for the drive's "average access time". This is the time taken by the drive to locate the right track on which a piece of data is stored, and the specific place on the track where that data is sitting. This time is usually quoted in milliseconds.

As well as "average access time" look out for "transfer rates". The transfer rate is the speed at which the drive can deliver the data from the disk platters to the CPU. This is generally described in megabytes per second.

In order to get an accurate view of a hard drive's performance, the average access time and the transfer rate should be looked at together. Drive makers and dealers have a reputation for bending the truth on such issues and are often found to quote the fast access time of a drive without any mention of the transfer rate. You'll also see this in advertisements. Unfortunately, a high access time coupled with a slow transfer rate produces a slow drive.

Because access time is measured in milliseconds and transfer rate is measured in megabytes per second, the overall drive performance can be difficult to get your head around. Essentially, you're looking for the lowest possible access time and the highest possible transfer rate.

Another measure of hard disk performance of which you should be aware is "seek time", which is conveniently confused (by some) with the access time. Seek time is also measured in milliseconds and defines the amount of time it takes a hard drive's read/write head to find the physical location of a piece of data on the disk. The seek time says absolutely nothing about the speed of a hard drive. The importance of the access time and transfer rate is that they tell you how long a hard drive takes to locate and retrieve data.

PCW Contacts

Eleanor Turton-Hill welcomes feedback and suggestions from readers. She is on **ellie@pcw.ccmail.compuserve.com**

Buying a PC

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modern software.

Things not to do when buying
• Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
• Avoid older VESA local bus motherboards.
• Avoid cheap 14in monitors.

Things to do when buying
• You can never have too much disk space. Spend extra cash on the next hard disk size up.
• Memory is expensive, but extra memory often makes more difference than a faster processor.
• Look at the bundle. What other software is included — is it worth having?
• Check the warranty. Is it for on-site or back to base repairs? If it's on-site, does the manufacturer offer guaranteed response times?
• Check the technical support. Is it free? Is it easy to get through to?

PCW Minimum Specification

This is the absolute minimum spec we think you should even consider buying now. It's suitable for general business use: word processing, databases and spreadsheets.
• Windows 3.11
• 486 DX4 100 MHz processor
• 8Mb RAM
• Graphics card with 1Mb of memory
• 540Mb hard disk
• 3.5in floppy disk drive
• Double-speed CD-ROM drive
• 14in colour monitor
• PCI local bus

If you're buying the PC for home use, you'll probably want full multimedia capabilities so that you can use CD-ROM games and edutainment products and play video clips. This should include at least a
• 16-bit SoundBlaster-compatible sound card
• Speakers

PCW Recommended Specification

If you're not completely strapped for cash this is the PC specification we recommend. No-one who works at *PCW* would settle for less.
• Windows 95
• Pentium 90MHz or 120MHz processor (a faster processor will make your computer run more quickly and smoothly)
• 256Kb secondary cache (again this makes your computer run faster)
• 16Mb EDO RAM. 16Mb of memory speeds your PC up a lot, particularly if you're multitasking (using more than one application simultaneously)
• Graphics card with 2Mb of memory
• 1Gb hard disk — modern computer software takes up a lot of space
• 3.5in floppy disk drive
• Quad-speed CD-ROM drive (video clips will play more smoothly; you will be able to access files on CD-ROM disks more quickly)
• 15in colour monitor (one inch doesn't sound a lot, but is easier on the eyes)
• 16-bit SoundBlaster-compatible sound card
• Speakers
• PCI local bus

For up-to-date PC reviews, see our May '96 cover story

PCW Best Specification

Our Best Spec is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need to add even more memory, a bigger hard disk, a more powerful graphics card, or a larger monitor.
• Windows 95
• Pentium 133MHz PC
• 512Kb secondary cache
• 32Mb EDO memory
• 2Gb hard disk
• 3.5 in floppy disk drive
• Six-speed CD-ROM drive
• 17in colour monitor
• 2Mb VRAM graphics card (this means your graphics card can display more colours and a higher resolution on your monitor — 16 million colours at a resolution of 800 x 600, to be exact)
• 32-bit sound card
• Quality speakers
• PCI local bus

Other things to consider

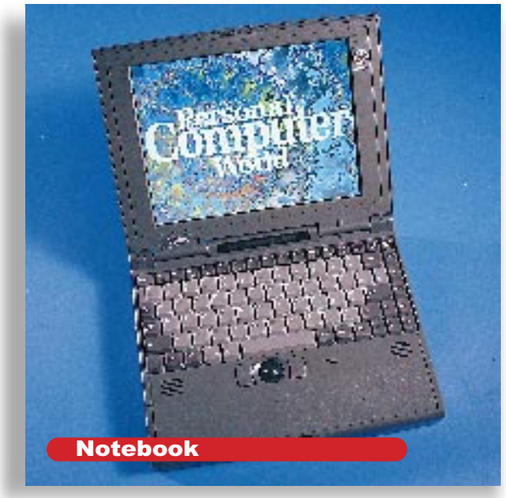
PCs have become a lot more similar in the last few years. The days when smallish computer companies designed their own chipsets (the computer chips that assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design their motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Buying a NOTEBOOK

Notebooks are one area in which it's often safer to stick to brand-names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability does seem to be a problem and it can be fiendishly difficult to obtain spares. The other useful guideline for notebooks is t try before you buy.

Standard notebook specifications are generally a step or two behind the desktop equivalents. For example, quad-speed CD-ROM drives are still no standard on notebooks, whereas on desktops the six-speed variety is alread well established. The latest generation of colour screens can cope with 800 x 600 resolution, but that's still a step behind the desktop 1,024 x 768 standard.

What to look for in a notebook
• **Pointing device** There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).
• **CD-ROM** drives are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.
• **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. Again, if the notebook is to be your only machine, specify both. Otherwise, reinstalling an operating system can mean returning the machine to the manufacturer.
• **PC cards** Modern notebooks all have at least one PC card slot. They take credit-card sized expansion cards which can add a fax-modem, a network interface card or even an extra hard disk to your computer.
• **Battery life** Battery technology keeps improving, but unfortunately the power demands of ever more powerful notebooks tend to keep pace. Battery life varies from as little as 30 minutes over six hours. Lithium Ion and Nickel Metal Hydride batteries have now largely replaced the older Nicad (Nickel Cadmium) batteries.
• **TFT screens** TFT or active matrix screens are starting to replace the slower dual-scan or passive matrix screens. It means the screen image is refreshed much more quickly.
• **Warranty** Drop a notebook and it may well break, so it is especially vital to check the terms of your warranty. How long is it? What level of service is provided.



PCW Minimum Specification

Notebooks change rapidly. It's often possible to pick up end-of-line machines with 486 processors from brand-name manufacturers such as Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use. They probably aren't up to running Windows 95.

PCW Recommended Specification

• Windows 95
• Pentium
• 256Kb secondary cache
• 16Mb RAM
• On-board graphics with 1Mb of memory, PCI local bus
• 500Mb hard disk
• 3.5in floppy disk drive and/or dual-speed CD-ROM drive.
• Dual-scan screen.

PCW Best Specification

The state of the notebook art. You're either loaded, or your company's picking up the tab.
• Windows 95 or Windows 3.11
• Pentium
• 256Kb secondary cache
• 16Mb RAM
• On-board graphics with 2Mb of VRAM memory, PCI local bus
• 1Gb hard disk
• 3.5in floppy disk drive
• Quad-speed CD-ROM drive
• Active matrix TFT screen
• Long battery life

For recent notebook reviews, see PCW March, page 133

GLOSSARY OF COMPUTING: IMPORTANT TERMS AND ACRONYMS

A

Access Time
The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average, as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Acronyms
These form most of the technobabble which has been refined over many years to confuse you, the user, and keep us, the writers, in business. Try to take as little notice as possible of it: the computer industry is littered with TLAs (Three-Letter Acronyms).

Applications
An application, or package, is one or more programs used for a particular task: for example, word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for more specific uses.

ASCII (American Standard Code for Information Interchange)
Usually a synonym for plain text without any formatting (eg italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible
Compatibility of hardware or software to older versions of the product or standard.

Baud rate
The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V* and Bit)

BIOS
Basic Input/Output System (pronounced buy-oss). Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit
Binary digit, the basic binary unit for storing data. It can either be 0 or 1. A Kilobit (kbit) is 2^{10}, 1024 bits; and a Megabit is 2^{20}, which is just over a million bits. These units are often used for data transmission. For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1024 kilobytes (Kb) and a Kb is 1024 bytes. A Gigabyte (Gb) is 1024 Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot
Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press Ctrl Alt Del) or a cold reboot, where you switch the computer off and back on again.

Bulletin board systems (BBSs)
A kind of electronic forum now being replaced by the Internet. (See net.newbies, p229)

Bus
A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST
Cache On A Stick.

CD-ROM
A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data — equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, but this makes them ideal for archiving.

CISC (See **RISC**)

CPU
Central processing unit. Normally

refers to the main processor or chip inside a PC. (See Processor)

Crash
Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software), or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)
Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)
Common measure of the resolution on a printer, a scanner or a display.

Drive controller card
An expansion card that interprets commands between the processor and the disk drives.

Drivers
Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac, just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)
A bus standard designed to compete with MCA now being replaced by PCI. Its advantage was that it was designed to be backwards compatible with the now-ancient but still dominant ISA interface (as the name implies).

Electronic mail (E-mail, email)
(See net.newbies, p207)

Expansion card
Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external one (which are more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive
Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy 5.25in disks.

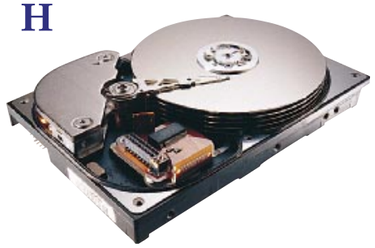
Fonts
A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. Modern TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format
To wipe a floppy or hard disk in order to prepare it to accept data.

Graphics Card
An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)
(See Windows)

H



Hard disk
Sometimes called a fixed disk, hard disks are hermetically-sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb, but disks of up to 9Gb are available.

Hardware
All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)
The standard language used in the creation of World Wide Web pages.

I

IBM-compatible
Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

Internet
(See net.newbies, p229)

IDE
Integrated drive electronics. A control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features. EIDE can support four external devices including hard disks and CD-ROM drives.

IRDA
Infra Red Data Association — standard for exchanging data using infra red typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)
This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI)

ISDN Integrated Services Digital Network
A digital voice and data telephone network which looks set to replace the current analogue one. ISDN adaptors are already starting to replace modems as a fast way of accessing the Internet and transferring data.

JPEG (See **MPEG**)

Kbit (kilobit), Kb (kilobyte)
(See **Bit**)

L

LAN (Local Area Network)
(See **Network**)

Local Bus
PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it has now largely replaced.

M

Macintosh (Mac)
A kind of personal computer, made by Apple, that is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows, except that it predates it and (in many people's view) looks and works much better.

Maths co-processor
A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See **Bit**)

Mb (Megabyte) (See **Bit**)

MCA
A kind of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)
A standard for compressing video available in several flavours: MPEG 1, MPEG 2 and MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory
The term normally refers to RAM (Random Access Memory). This is the kind that disappears whenever you turn your computer off and is much faster to access than a hard disk. It acts as a kind of staging post between your computer's hard disk and its main processor.

•DRAM Dynamic Random Access Memory
This requires its contents to be replaced every 1/1000th of a second and is the most common form of memory in PCs.

•SRAM StaticRAM
Retains memory until the power is switched off.

•VRAM VideoRAM
Faster than DRAM, this is used by graphics cards.

•EDO Extended Data Out RAM
The latest type of memory, offers improved performance.

Cache memory
Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of cache built in. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is also often used to cache your hard disk.

ROM Read-Only Memory
A kind of memory that can only be read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

Modem
The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers. They are commonly used for sending electronic mail and accessing the Internet. (See net.newbies, p213)

Monitor
Your computer's screen. Signals are sent to it from the video card.

Motherboard
The main printed circuit board which houses the processor, the memory and various other components.

N

Network
A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. Typically, all the PCs on a LAN are connected to one server, a powerful PC with a large hard disk that can be shared by everyone. There are many other forms of interlinking computers including WANs (Wide Area Networks).

O

Operating System
The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

Package
(See Application)

PC Card
Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)
Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local Bus)

PCMCIA (See PC Cards)

Parallel Ports
Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pixel
Picture element. The smallest possible addressable dot displayed on a monitor.

PowerPC
This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor
The chip that does most of a computer's work.

Programs (See Applications)

Public Domain
Software that is absolutely free. The author usually retains copyright, but you can make as many copies as you want and pass them to other people. Public domain software often consists of small utilities the author feels might be useful to other people. It is often confused with shareware.

Q

QWERTY
The name of a standard English language keyboard, derived from the first six letters on the top row. The French equivalent is AZERTY.

R

RAM Random Access Memory (See Memory)

Reboot (see Boot)

RISC
Reduced Instruction Set Computing. These are starting to replace CISC (Complex Instruction Set Computing), as they are generally faster. The PowerPC chip is a typical example.

ROM (Read Only Memory) (See Memory)

RTF Rich Text Format (See ASCII)

S

SCSI
Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs. It is commonly used for connecting devices such as hard disk drives and CD-ROM drives.

GLOSSARY OF COMPUTING: IMPORTANT TERMS AND ACRONYMS

Serial Port
The serial port, of which there are sometimes two (com1 and com2), is used by your PC to communicate with the outside world. Serial ports are predominantly used by modems and similar devices, which communicate quite slowly. Some mice also use them. Faster communications are achieved via the parallel port.

Shareware
A way of distributing software which is often used by smaller programmers rather than big software houses. It is freely available, but not free. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)
The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities of up to 16Mb.

Software
A generic word for programs or applications

T

Tape Streamer
Magnetic tape recorder designed for backing up data from your hard disk.

U

UART (Universal Asynchronous Receiver Transmitter)
Pronounced you-art. A chip that allows your PC to cope with high-speed communications.

V34, V32bis
A series of CCITT standards that defines modem operations and error correction. There are over 20, but the key ones are:
• V32.bis — the standard for 14,400bps modems.
• V34, the new standard for 28.800bps modems (see Baud). Don't buy a modem that doesn't comply with one of these standards.

VESA
(See **Local Bus**)

VGA
Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)
VRAM (See Memory)

W

Windows
A GUI (Graphical User Interface) developed by Microsoft. Windows is supposed to make programs easier to use by giving them a standard, mouse-driven interface.

Windows 3.11
16-bit operating system.

Windows NT
Robust, fully 32-bit operating system. Currently has the Windows 3.11 interface, but will soon be available with the Windows 95 interface.

Windows 95
Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.

WYSIWYG
An acronym for What You See Is What You Get, used to describe much modern software. What you see on the screen is exactly what you see when you print your work out.

Z

ZIF (Zero Insertion Force)
Sockets used for large CPUs. Lifting a handle lets you remove the processor.

ZIP
Better known as PKZIP, this is a widely used shareware utility that compresses files, so that they take up less room. You can tell when you have a ZIPped file as its name ends in ZIP. It is widely available from bulletin boards. PKZIP is the most common form of compression of its kind.

Glossary ends

Continued from page **335**

Buying a PRINTER

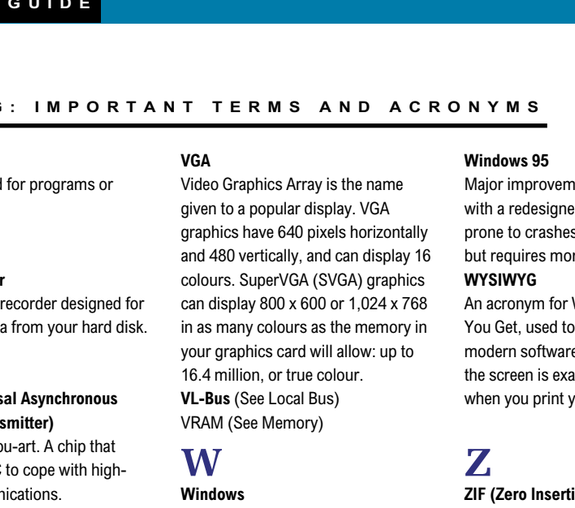
There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work pretty much like photocopiers, and are cheap to run and print quickly. Their disadvantage is higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £400. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

Types of laser

PCs work by sending a description of the page that's being printed down a printer cable. There are three commonly-used page description languages (PDLs):



Laser printers

PostScript
This sends an outline in vector form (see "Drawing Software") to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so that the image looks the same on a monitor (75dpi), a laser printer (300dpi) or a professional image setter (2400dpi).

PCL
This stands for Printer Control Language, and it is Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using this tend to be cheaper than PostScript ones, but output will vary from one printer to another, making it less suited to professional use.

GDI (graphical device interface)
These printers download the description of your page already used by Windows

Inkjets

straight to your printer. They will only work with Windows, but are cheap and fast. They are also only suitable for a personal printer and will not work across a network.

Recommended Products
Cheap lasers Epson EPL-5500: Epson 0800 220546; street price £300 (see *PCW* February 96)
Sub-£750 lasers Hewlett-Packard 5P: Hewlett-Packard 01344 369222 (see *PCW* November 96)
Network lasers Hewlett-Packard 5P: Hewlett-Packard 01344 369222 (see *PCW* February 96)

Inkjets

Inkjets work by spraying ink onto paper. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good-quality colour.

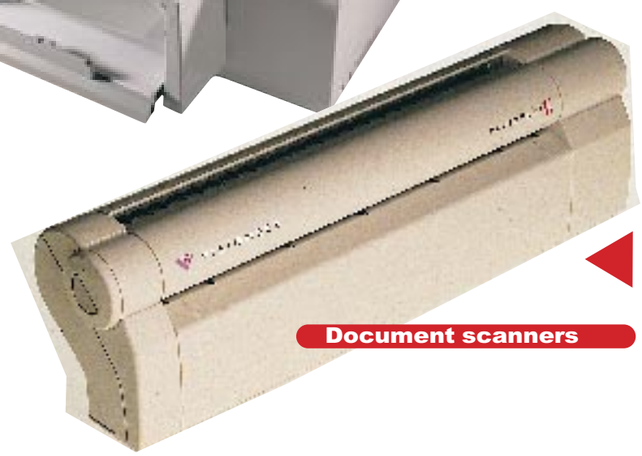
Recommended Products
Epson Stylus 800 colour: Epson 01442 61144; street price £350 (see *PCW* August 95). **Canon BJC-610**: Canon 0500 246246; street price £370 (see *PCW*, February 96).

Hybrids

For home use and small offices a hybrid could be the answer. These combine a printer, a fax machine and some copying capability in one unit.

Recommended Products
Hewlett-Packard OfficeJet LX: HP 01344 369222; street price £499 (see PCW December 95)

Hybrid printer



Document scanners

Buying a SCANNER

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

The most common type of scanner. They range in price from £300 to over £3,000. They're capable of scanning colour pictures to a high standard. Most have transparency adaptors as an optional extra.

Document scanners

This is a new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forte.

Flatbed scanners

Recommended Products: Flatbed Scanners
Professional — Arcus II: Agfa 0181 231 4200; street price £2,600.
Intermediate — Epson GTX 9000: Epson UK 01442 61144; street price £750.
Budget —Umax Vista S6E: IMC 01344 872800; street price £299 (*PCW*, July 96).

Recommended Products: Document Scanners
Visioneer PaperPort VX: Computers Unlimited 0181 200 8282; street price £299. **Logitech PageScan Colour:** Logitech 01344 894300; street price £299.
Plustek PageReader 800: Scan Direct 01292 671676; street price £149 (*PCW*, March 96).

Buying a FAX-MODEM

Fax-modem

You'll need a modem to connect to the Internet or an online service such as CompuServe or AOL, and to send and receive email. Modems are available in three formats: as PC cards to plug into notebooks, as external boxes, and as expansion cards. PC card modems cost the most and external modems cost slightly more than the expansion card variety.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have fax capability built in, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14,400Kbits/sec modem is adequate. However, prices have now fallen so rapidly that a V34 28,800Kbits/sec modem is probably a better bet.

Recommended Products: Fax-modems

External — Motorola 3400 Online: Motorola 01923 404343; street price £160 (see *PCW* February 96)

Buying a CD-ROM DRIVE


CD-ROM Drives

Just about the only things which differ on today's CD-ROM drives are their speed and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on many sound cards.

The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/s. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/s, and quad-speeds twice as fast again, raising transfer to 600Kb/s.

Quads are currently the standard, with six-speeds (900Kb/s) becoming increasingly common. Manufacturers are beginning to release eight-speed drives, offering up to 1200Kb/s. All figures are theoretical maximums. Buyers should go for quad-speed or higher. There is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE quads start at around £100 and six-speeds around £130.

Recommended Product: CD-ROM Drive

Teac CD56-E six-speed: fitted to many new PCs and costing around £170 (*PCW* January 96)

Buying a MONITOR

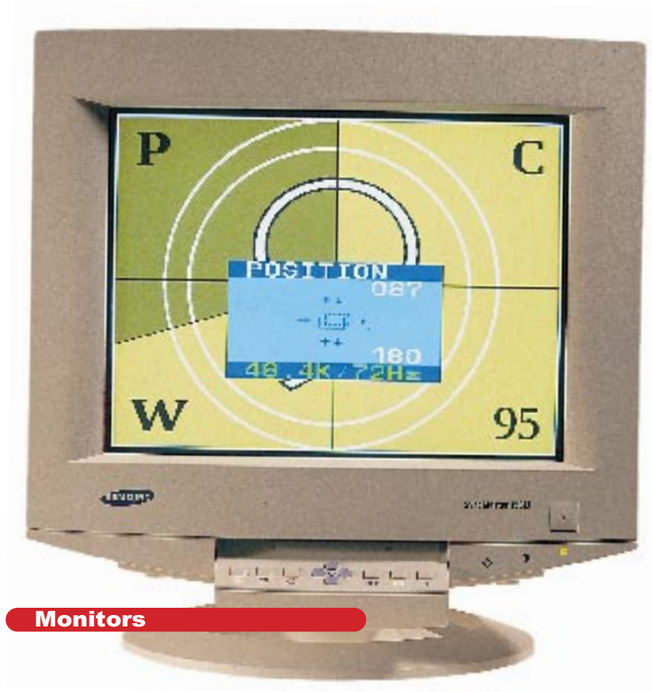
Regardless of your computer application, you'll be looking at your monitor all day — so get a good one.

Some people claim not to see monitor-flicker, but your brain will, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors. Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes.

The resolution refers to the number of dots (pixels) horizontally and vertically on screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 by 768, non-interlaced, at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in may only have 14.5in, and a 17in only 16in.

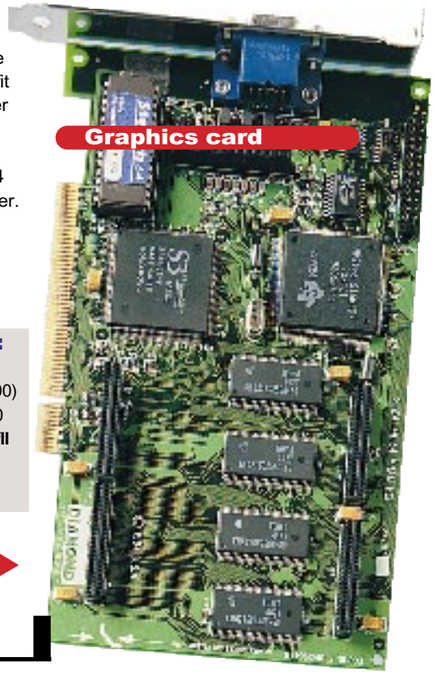
Recommended Products: Monitors

For 15in try the CTX 1569MS (around £300) **or the NEC M500** multimedia around £410 on the street. At 17in there's the **Sony 17sfII or the Taxan Ergovision 730TCO-S** at around £500 (PCW July 96)



Monitors

Buying a GRAPHICS CARD


Graphics card

The graphics card sits inside the PC and controls the features that the software can display on the monitor.

Check the amount of memory on the card. 2Mb is about standard these days, 1Mb is skimpy and 512Kb is barely usable. Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit — all you need to know is that a large numbers of bits means faster performance and more colours.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on the screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz. The refresh rate is important, as it relates to the flicker that you will perceive from your monitor.

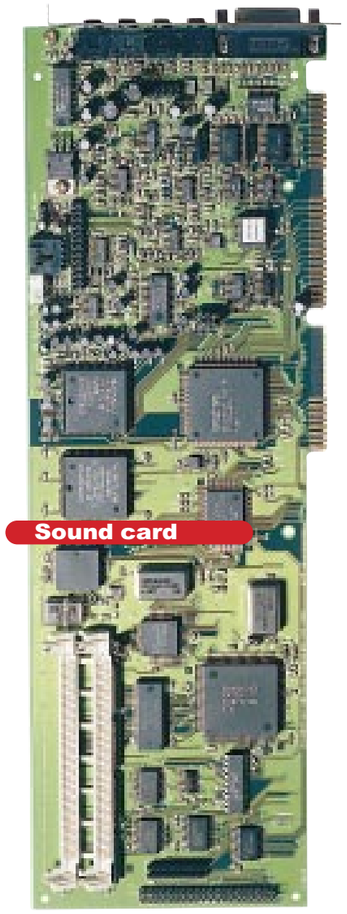
Finally, find out whether your video card is "local bus" or not. "Local bus" is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU which makes it a lot faster than the standard ISA (Industry Standard Architecture) interface.

Recommended Products: Graphics Cards

ATI Video Xpression: ATI Technologies 01235 833666; around £175 (Graphics card group test p150)

Diamond Stealth 64 VRAM: **Diamond 01753 501400**; from around £190

VideoLogic GrafixStar 400: VideoLogic 01923 260511 from about £115


Sound card

Buying a SOUND CARD

As their name suggests, they add sound capability to a PC. Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better sound cards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable. The newer cards are also plug'n'play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

Recommended Products: Sound Cards

Creative Labs AWE-32: 01245 265265; £199 (PCW April 96)

Budget: Aztec SoundGalaxy Waverider Pro: Aztec 01734 814121; £79 (PCW April 96)

Buying SOFTWARE

Just a few years ago there were dozens of different software applications in each category. In the last two years or so, however, there's been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and aren't worth considering. We've distilled each category down to just one or two recommended products.

Software A-Z

A

● **ACCOUNTS SOFTWARE** One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS.
Recommended products: Lakeview LMS and Exchequor from SBS Systems.

C

● **CAD SOFTWARE** Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings.
Recommended products: AutoCAD, now at release 13, is still the industry standard. However, it's expensive and complex. For the casual user, Drafix QuickCAD is a cheap and accessible way to try your hand at it.

● **CONTACT MANAGERS** (see PIMs)

D

● **DATABASE** At its simplest, an electronic card index. For just a few hundred names and addresses, an electronic filofax such as Lotus's Organizer may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most office environments you're more likely to use a database application that somebody else has written for you.
Recommended products: Lotus Approach, Microsoft Access

● **DRAWING SOFTWARE** Programs for drawing that work using vectors. This means each shape drawn is described using mathematical equations.
Recommended products: At the budget end, GSP Designworks 3 stands out. At the professional end of things it's FreeHand 5 which gets our plaudits.

I

● **IMAGE EDITING SOFTWARE** A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing.
Recommended product: For simple image editing the popular shareware program Paintshop Pro is fine. For professionals, Adobe's Photoshop is the industry standard.

● **INTEGRATED PACKAGES** Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications in the Suites.
Recommended product: Microsoft Works

● **OCR SOFTWARE** Optical Character Recognition software converts printed text into computer text you can edit. You will also need a scanner or fax card to get the printed text on to your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.
Recommended products: Omnipage is the best product we've found, but TextBridge offers most of the same capabilities for less cash.

● **PERSONAL FINANCE** These help you manage home finances. They're also well suited to some small businesses and tend to be easier to use than full-blown accounts packages.
Recommended products: Quicken is the outstanding product in this category and has no serious rivals.

● **REMOTE CONTROL SOFTWARE** Software which lets you access and control a PC remotely usually using a modem.
Recommended products: Reachout, for its simple interface and support for different networks, particularly TCP/IP.

● **SPREADSHEET** An electronic version of an old-fashioned ledger. Ideally suited for balance sheets and sales figures. They now include excellent graphing and charting facilities.
Recommended products: Lotus 1-2-3, Microsoft Excel

S

● **SUITES** These days, most general business software (word processors, spreadsheets, presentation graphics packages) is sold in Suites. Two suites are widely available: Lotus SmartSuite and Microsoft Office. If you buy them bundled with a new PC, they can cost £100 or less. Bought separately, they cost between £200 and £300. Lotus SmartSuite also contains a database. For Microsoft Office you pay extra for Office Professional which contains Microsoft's Access database.
Recommended products: Microsoft Office is now close to the industry standard. Its high level of integration gives it the edge over the opposition.

P

● **PERSONAL INFORMATION MANAGERS (PIMs)** PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients.
Recommended products: Sidekick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

● **PRESENTATION GRAPHICS** Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips.
Recommended products: Powerpoint and FreeHand are both capable products that are sold with Microsoft Office and SmartSuite respectively.

● **PROGRAMMING TOOLS** Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which are much easier to use but generally sacrifice performance and flexibility in the process.
Recommended products: Delphi 2.0 is a great example of scalability, catering for beginners *and* serious developers working on major projects. Visual C++ is the pick of the high-end Windows development tools.

V

VISUAL PROGRAMMING (see Programming Tools)

W

WORD PROCESSOR An application in which you write letters and reports or even produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding up columns of figures.
Recommended products: Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.

A-Z of Recommended Software Products

	Category	Product	Supplier	Contact	Price	Date of PCW review
A	Accounts	Lakeview LM3	Lakeview Computers	0181 303 3329	£8,750	Jan-96
	Accounts	Exchequor	SBS Financial Systems	01202 298008	£5,980	Jan-96
C	CAD	AutoCad Release 13	Autodesk UK	01483 303 322	£3,150	Oct-95
	CAD	Drafix Quick CAD	Roderick Manhattan	0181 875 4400	£69	Oct-95
D	Database	Approach	Lotus	01784 455 445	£99	Nov-95
	Database	Access	Microsoft	01734 270 001	£220	Feb-96
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr-96
	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr-96
I	Image Editing	Photoshop	Adobe	0181 606 4000	£382	Apr-95
	Image Editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun-95
	Integrated Package	Works	Microsoft	01734 270 001	£79.99	Oct-95
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov-95
	OCR	Textbridge	Xerox Imaging Systems	01734 668 421	£349	Nov-95
P	Personal Finance	Quicken	Intuit	0800 585058	£49.95	May-96
	PIM/contact manager	Organizer 2.1	Lotus	01784 455 445	£99	Mar-96
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar-96
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar-96
	Presentation graphics	Freelance	Lotus	01784 455 445	£415	Sep-94
	Presentation graphics	Powerpoint	Microsoft	01734 270 001	£220	Sep-94
	Programming tools	Visual C++	Microsoft	01734 270 001	£379	Feb-96
	Programming tools	Delphi 2.0	Borland	01734 320 022	249	Feb-96
R	Remote Control	Reachout	Stac Electronics	01483 740 763	£110	Nov-95
S	Spreadsheet	Excel	Microsoft	01734 270 001	£220	May-95
	Spreadsheet	1-2-3	Lotus	01784 455 445	£365	May-95
	Suite	Office (Standard)	Microsoft	01734 270 001	£360	Mar-96
	Suite	Office (Professional)	Microsoft	01734 270 001	£460	Mar-96
W	Word Processing	Word	Microsoft	01734 270 001	£220.00	Feb-95
	Word Processing	WordPro (AmiPro)	Lotus	01784 455 445	£99.00	Jun-95

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3. Keep copies of all correspondence, and if you speak on the phone make a note of who you spoke to.
4. On large orders obtain a written quotation.
5. Wherever possible pay with a personal credit card. All transactions over £100 should be covered by the card company's insurance scheme.
6. Does the price quoted include everything discussed? Is VAT extra?
7. Check how they will deliver and if times are guaranteed.
8. Is telephone support or on-site maintenance included in the price? If a return to base warranty can be extended, how much does it cost?
9. Check that all branded components are genuine.
10. Is the supplier reputable? Do they comply with BS5750 or ISO900? If in doubt, ask to see customer testimonials.

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ORDER FORM

Personal Computer World

Use this form when you order by phone, fax or post.

ALWAYS KEEP A COPY !

ORDER FORM

SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

ORDER REFERENCE NUMBER (IF QUOTED) .....

DISPATCH REFERENCE NUMBER .....

CUSTOMER DETAILS

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / .....

ORDERED BY: ❑ TELEPHONE ❑ FAX ❑ POST

ADVERT APPEARED IN PCW:

ISSUE DATE ..... PAGE .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

METHOD OF PAYMENT

❑ PERSONAL CHEQUE ❑ PURCHASE ORDER ❑ CREDIT CARD

❑ C.O.D ❑ CHARGE CARD ❑ OTHER (SPECIFY) .....

CREDIT CARD COMPANY ..... START DATE ..... / ..... / .....

CHARGE CARD COMPANY ..... START DATE ..... / ..... / .....

CARD NUMBER (below) EXPIRY DATE ..... / ..... / .....

❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑

SUB TOTAL	
DISCOUNT	
CARRIAGE	
SURCHARGES	
VAT	
TOTAL	

DELIVERY DETAILS

DELIVERED TO (ADDRESS)
(IF DIFFERENT FROM ABOVE) .....

.....

..... POSTCODE .....

AGREED DELIVERY DATE ..... / ..... / .....

❑ TERMS OF WARRANTY ❑ MONEY BACK

❑ RETURNS POLICY ❑ COST OF EXTENDED WARRANTY

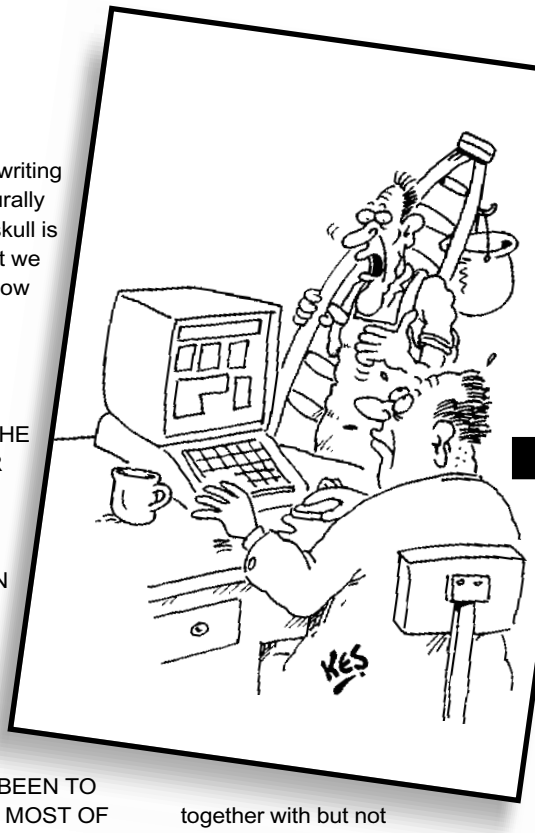
❑ HELPLINE

Details: .....

.....

SIGNED ..... DATE ..... / ..... / ..... DAYTIME TELEPHONE NUMBER .....

ChipChat



Oops!

● In our review of Cheyenne's InocuLAN (*First Impressions*, May), we inadvertently stated that it could not download regular virus updates: in fact, Cheyenne has a BBS set up for just that. Updated monthly, it can be accessed on 0990 143012.

Discovered on the Internet: Bubba's User Manual

I once unpacked a SCSI drive shipped from Bubba's in Louisiana and it arrived with these instructions in the packaging:

"IMPORTANT! READ THIS BEFORE USING YOUR NEW DEVICE

Congratulations! You have purchased an extremely fine device that would give you thousands of years of trouble-free service, except that you undoubtedly will destroy it via some typical bonehead consumer manoeuvre. Which is why we ask you to:

PLEASE FOR GOD'S SAKE READ THIS OWNER'S MANUAL CAREFULLY BEFORE YOU UNPACK THE DEVICE. YOU ALREADY UNPACKED IT, DIDN'T YOU? YOU UNPACKED IT AND PLUGGED IT IN AND TURNED IT ON AND FIDDLED WITH THE KNOBS, AND NOW YOUR CHILD, (THE SAME CHILD WHO ONCE SHOVED A POLISH SAUSAGE INTO YOUR VIDEOCASSETTE RECORDER AND SET IT ON 'FAST FORWARD'); THIS CHILD IS ALSO FIDDLING WITH THE KNOBS, RIGHT? WE MIGHT AS WELL JUST BREAK THESE DEVICES RIGHT AT THE FACTORY BEFORE WE SHIP THEM OUT, YOU KNOW THAT?!?

We're sorry. We just get a little crazy sometimes because we're always getting back "defective" merchandise where it turns out that the consumer inadvertently bathed the device in acid for six days. So, in writing these instructions, we naturally tend to assume that your skull is filled with dead insects, but we mean nothing by it. OK? Now let's talk about:

OPERATION OF THE DEVICE.

WARNING: WE MANUFACTURE ONLY THE ATTRACTIVE DESIGNER CASE. THE ACTUAL WORKING CENTRAL PARTS OF THE DEVICE ARE MANUFACTURED IN JAPAN. THE INSTRUCTIONS WERE TRANSLATED BY MRS. SHIRLEY PELTWATER OF ACCOUNTS RECEIVABLE, WHO HAS NEVER ACTUALLY BEEN TO JAPAN BUT DOES HAVE MOST OF "SHOGUN" ON TAPE.

INSTRUCTIONS: For results that can be finest, we advising that: NEVER to hold these buttons two times!! Except battery. Next taking the (something) earth section may cause a large occurrence! However. If this is not a trouble, such rotation is a very maintenance action, as a kindly (something) virepoint as Drawing B.

WARRANTY

Be it hereby known that this device, together with but not excluding all those certain parts thereunto, shall be warranted against all defects, failures and malfunctions as shall occur between now and Thursday afternoon shortly before 2, during which time the Manufacturer will, at no charge to the Owner, send the device to our Service People, who will emerge from their caves and engage in rituals designed to cleanse it of evil spirits. This warranty does not cover the attractive designer case."

Four more ways to confirm that you like computers too much for your own good:

1. If you have more friends on the Internet than in real life.
2. If your favourite part of the six o'clock news is comparing their latest satellite weather picture with yours.
3. If your lap-top computer costs more than your car.
4. If your four basic food groups are: caffeine, fat, sugar, chocolate.

CENSORED!

CENSORSHIP OF THE INTERNET has some odd side effects. The latest victim of "American-rude-word" paranoia is the delightful South Humberside town of Scunthorpe. On AOL, Scunthorpe will henceforth be known as Sconthorpe. Unfortunately, *PCW* editorial policy means we're not able to spell out why.

Microsoft announces...

For the first time, in… oh, a decade I think… something from Microsoft shipped on time: Jennifer Katharine Gates, weighed 8lbs 6oz when she was downloaded, er, born on Friday at 6:11p.m (Pacific time). Mother and daughter are home and doing fine.

And what do Baby Gates and Daddy's products have in common?

- Neither can stand on its own two feet without a *lot* of third-party support.
- At first release they're relatively compact, but they seem to grow and grow and grow with each passing year.
- Although announced with great fanfare, pretty much anyone could have produced one.
- They arrive in shaky condition with inadequate documentation.